REPLY TO THE ATTENTION OF:

JUN 0 5 2007

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Stephen H Armstrong
Ungaretti & Harris LLP
3500 Three First National Plaza
Chicago IL 60602-4224

RE: Peoples Gas Sites, Chicago, Illinois

Dear Steve:

Enclosed is your copy of the executed Administrative Order on Consent for an EE/CA at eleven
Peoples Gas Sites in Chicago, Illinois. Pursuant to Paragraph 108 of the AOC, the AOC is
effective upon the signature of the Superfund Division Director. Also enclosed is your copy of
the executed Administrative Order on Consent for a Removal Action at three Peoples Gas
Chicago Sites. Pursuant to Paragraph 74 of the AOC, the AOC is effective upon the signature of
the Superfund Division Director.

If you have any questions, please call me at (312) 886-5114. Thank you for your cooperation in
this matter.

Sincerely yours,

Peter Felitti

cc: Timothy Prendiville, SR-6J (w/o enclosures)
        Thomas Cook, SE-5J (w/o enclosures)
        Gary King, Deputy Manager
               Division of Land Pollution Control
               Illinois Environmental Protection Agency
               1021 North Grand Avenue East
               Springfield, Illinois 62702

Enclosures

bcc: Docket Analyst, ORC (C-14J)
    Valerie Mullins, Enforcement Specialist, EESS (SE-5J)
    John Maritote, EESS (SE-5J)
    Fushi Cai, EESS (SE-5J)
    Linda Haile (MF-10J)
    Records Center (SMR-7J)
    ERB Read File
    Denise Gawlilnski, Public Affairs (P-19J) w/out attachments
    Michael T. Chezik, Department of Interior

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5

IN THE MATTER OF:)   Docket No.   V-W- '07 -C-869
Peoples Gas   )
Manufactured Gas Plant Sites   )   ADMINISTRATIVE SETTLEMENT
Chicago, Cook County, Illinois   )   AGREEMENT AND ORDER ON
)   CONSENT FOR REMOVAL
)   ACTION
Peoples Gas,   )
Respondent   )   Proceeding under Sections 104, 106(a),
)   107, and 122 of the Comprehensive
)   Environmental Response,
)   Compensation and Liability Act,
)   as amended 42 U.S.C. §§ 9604, 9606(a), 9607 and 9622

I. JURISDICTION AND GENERAL PROVISIONS

1. This Administrative Settlement Agreement and Order on Consent ("Settlement Agreement") is entered into voluntarily by the United States Environmental Protection Agency ("U.S. EPA") and Respondent, The Peoples Gas Light and Coke Company ("Peoples Gas"). This Settlement Agreement provides for the performance of removal actions by Respondent and the reimbursement of certain response costs incurred by the United States at or in connection with the following properties: the 22nd Street Station ("22nd Street Station Site") located at 2200 South Racine Avenue, Chicago, Illinois; the Hough Place Station ("Hough Place Station Site") located at 2500 S. Corbett St., Chicago, Illinois; and the Pitney Court Station ("Pitney Court Station Site") located at 3052 Pitney Court, Chicago, Illinois; These properties are depicted in Appendix 1. These properties are referred to individually as a "Site" and collectively as the "Sites".

2. This Settlement Agreement is issued under the authority vested in the President of the United States by Sections 104, 106(a), 107 and 122 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 U.S.C. §§ 9604, 9606(a), 9607 and 9622, as amended ("CERCLA"). This authority has been delegated to the Administrator of the U.S. EPA by Executive Order No. 12580, January 23, 1987, 52 Federal Register 2923, and further delegated to the Regional Administrators by U.S. EPA Delegation Nos. 14-14-A, 14-14-C and 14-14-D, and to the Director, Superfund Division, Region 5, by Regional Delegation Nos. 14-14-A, 14-14-C and 14-14-D.

3. U.S. EPA has notified the State of Illinois (the "State") of this action pursuant to Section 106(a) of CERCLA, 42 U.S.C. § 9606(a).

4. U.S. EPA and Respondent recognize that this Settlement Agreement has been negotiated in good faith and that the actions undertaken by Respondent in accordance with this Settlement Agreement do not constitute an admission of any liability. Respondent does not admit, and retains the right to controvert in any subsequent proceedings other than proceedings to implement or enforce this Settlement Agreement, the validity of the findings of facts, conclusions of law, and determinations in Sections IV and V of this Settlement Agreement. Respondent agrees to comply with and be bound by the terms of this Settlement Agreement and further agrees that it will not contest the basis or validity of this Settlement Agreement or its terms.

II. PARTIES BOUND

5. This Settlement Agreement applies to and is binding upon U.S. EPA and upon Respondent and its successors and assigns. Any change in ownership or corporate status of the Respondent including, but not limited to, any transfer of assets or real or personal property shall not alter the Respondent's responsibilities under this Settlement Agreement.

6. Respondent shall ensure that its contractors, subcontractors, and representatives comply with this Settlement Agreement. Respondent shall be responsible for any noncompliance with this Settlement Agreement.

III. DEFINITIONS

7. Unless otherwise expressly provided herein, terms used in this Settlement Agreement which are defined in CERCLA or in regulations promulgated under CERCLA shall have the meaning assigned to them in CERCLA or in such regulations. Whenever terms listed below are used in this Settlement Agreement or in the appendices attached hereto and incorporated hereunder, the following definitions shall apply:

    a. "AOC" or "Settlement Agreement" shall mean this Agreement and all appendices attached hereto. In the event of conflict between the AOC and any appendices, this AOC shall control

    b. "CERCLA" shall mean the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended, 42 U.S.C. §§ 9601, et seq.

    c. "Day" shall mean a calendar day unless expressly stated to be a business day. "Business day" shall mean a day other than a Saturday, Sunday, or Federal holiday. In computing any period of time under this AOC, where the last day would fall on a Saturday, Sunday, or Federal holiday, the period shall run until the close of business of the next business day.

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d. "Effective Date" shall be the effective date of this Settlement Agreement as provided in Section XXVII.

e. "Future Response Costs" or "Oversight Costs" shall mean all costs, including direct and indirect costs, that the United States incurs in reviewing or developing plans, reports and other items pursuant to this Settlement Agreement, verifying the Work, or otherwise implementing, overseeing, or enforcing this Settlement Agreement on or after the Effective Date.

f. "Interest" shall mean interest at the rate specified for interest on investments of the U.S. EPA Hazardous Substance Superfund established by 26 U.S.C. § 9507, compounded annually on October 1 of each year, in accordance with 42 U.S.C. § 9607(a). The applicable rate of interest shall be the rate in effect at the time the interest accrues. The rate of interest is subject to change on October 1 of each year.

g. "MGP" shall mean manufactured gas plant.

h. "National Contingency Plan" or "NCP" shall mean the National Oil and Hazardous Substances Pollution Contingency Plan promulgated pursuant to Section 105 of CERCLA, 42 U.S.C. § 9605, codified at 40 C.F.R. Part 300, and any amendments thereto.

i. "PAHs" shall mean polycyclic aromatic hydrocarbons.

j. "Paragraph" shall mean a portion of this AOC identified by an Arabic numeral or a letter.

k. "Parties" shall mean the U.S. EPA and the Settling Respondent.

l. "Respondent" shall mean The Peoples Gas Light and Coke Company.

m. "Site" shall mean the following three properties: a portion of the 22nd Street Station ("22nd Street Station Site") located at 2200 South Racine Avenue, Chicago, Illinois; the Hough Place Station ("Hough Place Station Site") located at 2500 S. Corbett St., Chicago, Illinois; and the Pitney Court Station ("Pitney Court Station Site") located at 3052 Pitney Court, Chicago, Illinois; These properties are depicted in Appendix 1. These properties are referred to individually as a "Site" and collectively as the "Sites".

n. "State" shall mean the State of Illinois.

o. "U.S. EPA" shall mean the United States Environmental Protection Agency and any successor departments or agencies of the United States.

p. "Waste Material" shall mean 1) any "hazardous substance" under Section 101(14) of CERCLA, 42 U.S.C. § 9601(14); 2) any pollutant or contaminant under Section 101(33) of CERCLA, 42 U.S.C. § 9601(33); and 3) any "solid waste" under Section 1004(27) of RCRA, 42 U.S.C. § 6903(27).

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q. "Work" shall mean all activities Respondent is required to perform under this Settlement Agreement as set forth in Appendices 2 to 4.

IV. FINDINGS OF FACT

8. Based on available information, including the Administrative Record in this matter, U.S. EPA hereby finds that:

9. With regard to the 22nd Street Station Site:

a. The Site is located at 2200 South Racine Avenue in Chicago, Illinois. The Site, which is 7.2 acres in size, is bounded to the west by commercial property, to the north by Cermak Road followed by mixed residential and commercial properties, to the east by an electrical substation owned by Commonwealth Edison, and to the south by the South Branch of the Chicago River. The portion of the Site subject to the terms of this Settlement Agreement is depicted in Appendix 1.

b. The Site is no longer owned by Peoples Gas but is comprised of four parcels, which are currently owned and/or operated by Commonwealth Edison, Throop Realty LLC, Throop Towers LLC, and Midwest Generation.

c. The Site was initially developed by Peoples Gas in 1862 to produce coal gas. The Site was modified to produce carbureted water gas and oil gas in 1934. Some of the facilities were retired in 1938, and in 1944 two production sets were modified to produce reformed natural gas.

d. Peoples Gas began leasing portions of the Site to Commonwealth Edison in 1931 and sold the last portion of the Site to Commonwealth Edison in 1959. The Site stopped operating in 1958 and the entire plant was dismantled by 1960.

e. Various VOCs, SVOCs, metals, and cyanide were detected in groundwater samples collected at the Site in 2001. The direction of shallow groundwater flow is to the southwest, toward the former Throop's Canal and the South Branch of the Chicago River.

f. The surface soil at the Site is fill material composed primarily of gravel and sand with smaller amounts of silt, clay, brick, cinders, glass, and wood. Coal tar, free product, staining, and odors were observed at various locations during site investigations, and sheens were observed in borings installed in the fill in the former Throop's Canal. Metals (including arsenic, chromium, lead, silver, and selenium), BTEX, and a number of PAHs were detected at concentrations exceeding the Illinois Tier 1 screening levels in soil samples collected at the Site.

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g. Sediment samples were collected from a location in the South Branch of the Chicago River about 2,000 feet downstream of the Site in 2000 as part of a U.S. EPA study of sediment contamination. These samples contained high levels of PAHs, PCBs, oil and grease, and metals with the concentrations of these substances generally increasing with depth.

h. A CERCLA preliminary assessment of the Site was conducted by the Illinois EPA in 1988 which recommended further investigation. Site investigations were performed on behalf of Peoples Gas between 2000 and 2002. A Remedial Objectives Report developed for the Site during this period recommended removal of impacted material from a number of on-site locations. In April 2006, remediation activities began in a portion of the Site. Impacted material in the east gas holder has been excavated and removed to a depth of approximately 20 feet. Impacted material in portions of the former Throop's Canal have been excavated and removed to a depth of approximately 30 feet. Remediation of the Site by excavation and off-site disposal of impacted materials is continuing.

i. Removal work has been on-going at the Site under the Illinois Site Remediation Program.

j. A RCRA/CERCLA citizen suit regarding this Site was filed on October 31, 2006 and is currently pending.

10. With regard to the Hough Place Station Site:

a. The Site is located at 2500 S. Corbett St. in Chicago, Illinois. The Site is approximately 4.5 acres and is bounded on the north by the South Branch of the Chicago River, on the south by railroad property, and on the east by a paper storage and distribution facility. The former Site and the adjacent property to the west are currently vacant but were formerly occupied by a sailboat storage, sales, and repair facility (Crowley's Yacht Yard).

b. The Site is currently owned by Crowley's Yacht Yard.

c. The Site was built in about 1885 by the Equitable Gas Light and Fuel Company. In approximately 1892, the facility began producing "Pintsch gas," a relatively high quality gas produced by an oil gas process, for the Pintsch Compressing Company. Production of Pintsch gas appears to have continued into the early 1920s. Peoples Gas acquired the facility in 1897 after the passage of the Gas Consolidation Act of 1897. The station was dismantled in 1934, and all aboveground gas plant structures were removed. Portions of the property were subsequently leased to other companies, who used the property for storage of building materials and for making asphalt, concrete, or other paving materials through at least 1950. Chicago Title and Trust Company, as trustee, took title to the property in approximately 1953. For some period of time between 1953 and 1978, the J.M. Corbett Company operated an asphalt mixing plant on the property. In 1978 the property was sold to Crowley's Yacht Yard.

d. Water level data suggest that the direction of shallow groundwater flow at the Site is primarily toward the former slips to the east and west, with a northern

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component toward the South Branch of the Chicago River. BTEX, PAHs, metals, and cyanide were detected in groundwater samples collected at the site in 2000.

e. The Site is underlain by fill material consisting of silty clay mixed with sand and gravel, cinders, slag, brick fragments, and other assorted debris. Staining and odors have been observed in test pits and soil borings in various locations across the Site to depths below the water level. Black, plastic asphalt tar was observed to a depth of two feet in a test pit located in the northwest corner of the Site. BTEX, PAHs, metals and cyanide were detected in several surface and subsurface soil samples at the Site.

f. Several investigations at the Site have been conducted for Peoples Gas in recent years. A site investigation performed in 2000 included completion of test pits and soil borings and installation of shallow monitoring wells. Impacts were observed at various locations on the Site at depths below the water level. Soil samples were collected in June 2001 by as part of a supplemental site investigation. Several areas where tar was present at depths below the water table were identified. In September and October of 2006, a geotechnical investigation was conducted in order to design excavations necessary to remediate the Site. Soil borings advanced beyond the eastern Site boundary (in the location of the former Hough Slip) indicated that tar was present at depths below the water level in the filled-in slip. Remediation of the Site is currently under way; this effort involves excavation of impacted material to depths of up to 24 feet and off-site disposal of the excavated materials.

g. A limited investigation of the river area adjacent to the Site was conducted for Peoples Gas in November 2006. Several borings were advanced into river sediments. Impacts in the form of sheens, odor, tar globules, tar-coated or stained material, and traces of tar were observed in some of the borings.

h. Removal work has been on-going at the Site under the Illinois Site Remediation Program.

i. A RCRA citizen suit regarding this Site was filed on April 12, 2005 and is currently pending.

11. With regard to the Pitney Court Station Site:

a. The Site is located at 3052 Pitney Court, at the intersection of Archer Avenue and Pitney Court in Chicago, Illinois. The approximately 4.8 acre Site is bounded to the northwest by Archer Avenue, to the northeast by Pitney Court and 31st Street, to the east by Benson Street, to the south by Chicago Plating, Inc., a chrome plating facility, and to the west by the South Fork of the South Branch of the Chicago River.

b. Peoples Gas owns the Site, which is currently vacant and which will be developed for residential use. The land use in the surrounding area is mixed residential, industrial, and commercial.

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c. The Site was formerly used as a production and storage facility for manufactured gas. The Universal Gas Company began gas manufacturing operations at the Site in 1897. Peoples Gas leased the facility from Universal Gas in 1907 and purchased the Universal Gas Company in 1914. Peoples Gas sold the property in 1952 and re-purchased it in July 2005. The property had a number of owners and was used for a variety of purposes between 1952 and 2005.

d. Based on water level measurements, the groundwater flow is westerly toward the South Fork of the South Branch of the Chicago River. An interlocking sheet pile wall is located along the western side of the Site, adjacent to the South Fork. VOCs, SVOCs (including PAHs), metals, and cyanide have been detected in groundwater samples collected during investigations conducted at various times from 1995 through 2002.

e. Three stratigraphic units have been identified at the Site: a fill unit, a sandy silt unit, and a silty clay unit. Visible evidence of impacts, including coal tar, sheen, and/or staining was observed at depths below the groundwater level in several soil borings and test pits during site investigations. Metals (arsenic and lead), benzene, ethylbenzene, toluene, and a number of PAHs were detected at concentrations exceeding Illinois Tier 1 screening levels in soil samples collected at the Site.

f. Sediment samples were collected in the South Fork near the Site for the U.S. Army Corps of Engineers ("USACE") Chicago District in 2004. These samples contained PAHs, other SVOCs, VOCs, PCBs, oil and grease, and metals. An oily sheen was observed in sediments at two locations near the Site. The USACE findings are consistent with results obtained in earlier studies conducted by the Illinois EPA in 1994, the Metropolitan Water Reclamation District in 1995, and the U.S. EPA in 2000.

g. Conditions on the Site have been investigated by a number of parties since 1990. These investigations have reported subsurface impacts, including coal tar, staining, sheens, and odor, at various locations across the Site, in some cases below groundwater levels. An investigation performed in 1990 noted stained soils in conjunction with UST removal activities, and an investigation performed in 1995 concluded that the Site was impacted by past operations on the basis of detections of benzene and PAHs in soil and groundwater. Surface soil staining and a sheen on ponded surface water were noted in 1998, and tar was observed at depths of up to 20 feet below the water levels in the ground and the adjacent river in 2000. Additional site investigations conducted for Peoples Gas from 2002 through 2006 also found tar at varying depths. Site remediation activities began in 2005 and are continuing. These activities generally involve excavation and off-site disposal of MGP-impacted materials. To date, impacted materials, including tar-saturated material, have been encountered and removed at levels above and below the water table from the center of the Site and along the South Fork, directly behind the sheet pile river wall.

h. Several surface sediment samples collected in the South Fork adjacent to the Site had high fluorescence readings, indicating the presence of coal tar impacts. In addition, hollow stem auger sampling of sediments was also conducted. Tar-

saturated sediment was observed in several river boring locations, primarily at the sediment/river bottom interface.

i. Removal work has been on-going at the Site under the Illinois Site Remediation Program.

j. A RCRA citizen suit regarding this Site was filed on May 13, 2004. The matter was settled with the court retaining jurisdiction over the settlement.

V. CONCLUSIONS OF LAW AND DETERMINATIONS

12. Based on the Findings of Fact set forth above, and the Administrative Record supporting this removal action, U.S. EPA has determined that:

a. Each Site is a "facility" as defined by Section 101(9) of CERCLA, 42 U.S.C. § 9601(9).

b. The contamination found at the Sites, as identified in the Findings of Fact above, includes "hazardous substance(s)" as defined by Section 101(14) of CERCLA, 42 U.S.C. § 9601(14).

c. The Respondent is a "person" as defined by Section 101(21) of CERCLA, 42 U.S.C. § 9601(21).

d. The Respondent is a responsible party under Section 107(a) of CERCLA, 42 U.S.C. § 9607(a), and is liable for the performance of response action and for response costs incurred and to be incurred at the Sites.

i. The Respondent is the present "owner" and/or "operator" of the Pitney Court Site as defined by Section 101(20) of CERCLA, 42 U.S.C. § 9601(20).

ii. The Respondent is also the "owners" and/or "operators" of the Sites at the time of disposal of hazardous substances at the Sites, as defined by Section 101(20) of CERCLA, 42 U.S.C. § 9601(20), and within the meaning of Section 107(a)(2) of CERCLA, 42 U.S.C. § 9607(a)(2); and/or persons who arranged for disposal or treatment, or arranged with a transporter for transport for disposal or treatment of hazardous substances at the Sites, within the meaning of Section 107(a)(3) of CERCLA, 42 U.S.C. § 9607(a)(3); and/or persons who accept or accepted hazardous substances for transport to the Sites, within the meaning of Section 107(a)(4) of CERCLA, 42 U.S.C. § 9607(a)(4).

e. The conditions described in the Findings of Fact above constitute an actual or threatened "release" of a hazardous substance from the facility into the "environment" as defined by Sections 101(22) and 101(8) of CERCLA, 42 U.S.C.§§ 9601(22) and 9601(8).

f. The conditions present at the Site constitute a threat to public health, welfare, or the environment based upon the factors set forth in Section 300.415(b)(2) of the National Oil and Hazardous Substances Pollution Contingency Plan, as amended ("NCP"), 40 CFR § 300.415(b)(2). These factors include, but are not limited to, the following:

i. actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances, pollutants or contaminants;

This factor is present at the Sites due to the presence of hazardous substances in the soil exceeding Illinois Tier 1 screening levels. The health concerns at the Sites are related to the fact that workers, visitors or trespassers to the Sites are potentially exposed to contamination.

ii. high levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface, that may migrate;

This factor is present at the Sites due to the existence of elevated concentrations of hazardous substances in the soils at or near the surface that may pose a threat of further migration of contaminated materials due to rain or melting snow. There is also the possibility of airborne migration of hazardous substances attached to dust particles. People and animals coming in contact with contaminated areas could track the hazardous substances to other areas on-site as well as off-site.

iii. other situations or factors that may pose threats to public health or welfare or the environment;

This factor is present at the Sites due to the location of the Sites next to or near the Chicago River. The presence of various hazardous substances at the Sites present a risk of continued contamination migrating into the Chicago River, thereby impacting the ecological system of the river as well as the recreational use of the river.

g. The removal actions required by this Settlement Agreement are necessary to protect the public health, welfare, or the environment and, if carried out in compliance with the terms of this Settlement Agreement, will be considered consistent with the NCP, as provided in Section 300.700(c)(3)(ii) of the NCP.

VI. SETTLEMENT AGREEMENT AND ORDER

13. Based upon the foregoing Findings of Fact, Conclusions of Law, Determinations, and the Administrative Record for these Sites, it is hereby Ordered and Agreed that Respondent shall comply with all provisions of this Settlement Agreement, including, but not limited to, all

attachments to this Settlement Agreement and all documents incorporated by reference into this Settlement Agreement.

VII. DESIGNATION OF CONTRACTOR, PROJECT COORDINATOR, AND ON-SCENE COORDINATOR

14. Respondent shall retain one or more contractors to perform the Work and shall notify U.S. EPA of the name and qualifications of such contractor within 5 business days of the Effective Date. Respondent shall also notify U.S. EPA of the name and qualification of any other contractor or subcontractor retained to perform the Work at least 5 business days prior to commencement of such Work. U.S. EPA retains the right to disapprove of any or all of the contractors and/or subcontractors retained by Respondent. If U.S. EPA disapproves of a selected contractor, Respondent shall retain a different contractor and shall notify U.S. EPA of that contractor's name and qualifications within 3 business days of U.S. EPA's disapproval. The contractor must demonstrate compliance with ANSI/ASQC E-4-1994, "Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs" (American National Standard, January 5, 1995), by submitting a copy of the proposed contractor's Quality Management Plan ("QMP"). The QMP should be prepared consistent with "EPA Requirements for Quality Management Plans (QA/R-2)" (EPA/240/B0-1/002), or equivalent documentation as required by U.S. EPA.

15. Respondent has designated Narenda Prasad as Project Coordinator for the 22nd Street Station Site, the Hough Place Station Site and the Pitney Court Station Site. The Project Coordinator shall be responsible for administration of all actions by Respondent required by this Settlement Agreement for the Project Coordinator's particular Site. To the greatest extent possible, the Project Coordinator shall be present on Site or readily available during Site work. U.S. EPA retains the right to disapprove of the designated Project Coordinator. If U.S. EPA disapproves of the designated Project Coordinator, Respondent shall retain a different Project Coordinator and shall notify U.S. EPA of that person's name, address, telephone number, and qualifications within 4 business days following U.S. EPA's disapproval. The Respondent may name a different Project Coordinator for each Site. Receipt by Respondent's Project Coordinator of any notice or communication from U.S. EPA relating to this Settlement Agreement shall constitute receipt by Respondent.

16. U.S. EPA has designated Thomas Cook of the Emergency Response Branch, Region 5, as its On-Scene Coordinator ("OSC"). Except as otherwise provided in this Settlement Agreement, Respondent shall direct all submissions required by this Settlement Agreement to the OSC at U.S. EPA, Superfund Division, 77 West Jackson Boulevard, SE-5J, Chicago, Illinois 60604-3590, by certified or express mail. Respondent shall also send a copy of all submissions to Peter Felitti, Assistant Regional Counsel, 77 West Jackson Boulevard, C-14J, Chicago, Illinois, 606004-3590 and Timothy Prendiville, RPM, 77 West Jackson Boulevard, SR-6J, Chicago, Illinois, 606004-3590. Respondent is encouraged to make its submissions to U.S. EPA on recycled paper (which includes significant post consumer waste paper content where possible) and using two-sided copies.

17. U.S. EPA and Respondent shall have the right, subject to Paragraph 15, to change their respective designated OSC or Project Coordinator. U.S. EPA shall notify the Respondent, and Respondent shall notify U.S. EPA, as early as possible before such a change is made, but in no case less than 24 hours before such a change. The initial notification may be made orally but it shall be promptly followed by a written notice.

VIII. <u>WORK TO BE PERFORMED</u>

18. Respondent shall continue to perform and complete the removal activities it has begun at the three Sites under the Illinois Site Remediation Program.

19. <u>Work Plan and Implementation</u> On the Effective Date, Respondent shall commence implementation of the Work Plans attached hereto as Appendices 2 to 4.

20. <u>Health and Safety Plan</u>. Respondent shall implement the health and safety plan previously reviewed by U.S. EPA. Respondent shall implement the plan during the pendency of the removal action.

21. <u>Quality Assurance and Sampling</u>.

    a. All sampling and analyses performed pursuant to this Settlement Agreement shall conform to U.S. EPA direction, approval, and guidance regarding sampling, quality assurance/quality control ("QA/QC"), data validation, and chain of custody procedures. Respondent shall ensure that the laboratory used to perform the analyses participates in a QA/QC program that complies with the appropriate U.S. EPA guidance. Respondent shall follow, as appropriate, "Quality Assurance/Quality Control Guidance for Removal Activities: Sampling QA/QC Plan and Data Validation Procedures" (OSWER Directive No. 9360.4-01, April 1, 1990), as guidance for QA/QC and sampling. Respondent shall only use laboratories that have a documented Quality System that complies with ANSI/ASQC E-4 1994, "Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs" (American National Standard, January 5, 1995), and "EPA Requirements for Quality Management Plans (QA/R-2) (EPA/240/B-01/002, March 2001)," or equivalent documentation as determined by U.S. EPA. U.S. EPA may consider laboratories accredited under the National Environmental Laboratory Accreditation Program ("NELAP") as meeting the Quality System requirements.

    b. Upon request by U.S. EPA, Respondent shall have such a laboratory analyze samples submitted by U.S. EPA for QA monitoring. Respondent shall provide to U.S. EPA the QA/QC procedures followed by all sampling teams and laboratories performing data collection and/or analysis.

    c. Upon request by U.S. EPA, Respondent shall allow U.S. EPA or its authorized representatives to take split and/or duplicate samples. Respondent shall notify U.S. EPA not less

than 3 business days in advance of any sample collection activity, unless shorter notice is agreed to by U.S. EPA. U.S. EPA shall have the right to take any additional samples that U.S. EPA deems necessary. Upon request, U.S. EPA shall allow Respondent to take split or duplicate samples of any samples it takes as part of its oversight of Respondent's implementation of the Work.

22. Reporting.

a. Respondent shall submit a written progress report for each Site to U.S. EPA concerning actions undertaken pursuant to this Settlement Agreement every 30th day after the Effective Date of this Settlement Agreement until termination of this Settlement Agreement, unless otherwise directed in writing by the OSC. For each Site, these reports shall describe all significant developments during the preceding period, including the actions performed and any problems encountered, analytical data received during the reporting period, and the developments anticipated during the next reporting period, including a schedule of actions to be performed, anticipated problems, and planned resolutions of past or anticipated problems.

b. Respondent shall submit 3 copies of all plans, reports or other submissions required by this Settlement Agreement, or any approved work plan. Upon request by U.S. EPA, Respondent shall submit such documents in electronic form.

c. If the Respondent owns or controls property at any of the Sites, it shall, at least 30 days prior to the conveyance of any interest in real property at the Site, give written notice to the transferee that the property is subject to this Settlement Agreement and written notice to U.S. EPA of the proposed conveyance, including the name and address of the transferee. For property the Respondent owns or controls, it also agrees to require that its successors comply with the immediately proceeding sentence and Sections IX (Site Access) and X (Access to Information).

23. Final Report. Within 60 calendar days after completion of all Work at a Site that is required by Section VIII of this Settlement Agreement, Respondent shall submit for U.S. EPA review a final report summarizing the actions taken to comply with this Settlement Agreement. The final report shall conform, at a minimum, with the requirements set forth in Section 300.165 of the NCP entitled "OSC Reports" and with the guidance set forth in "Superfund Removal Procedures: Removal Response Reporting - POLREPS and OSC Reports" (OSWER Directive No. 9360.3-03, June 1, 1994). The final report shall include a good faith estimate of total costs or a statement of actual costs incurred in complying with the Settlement Agreement, a listing of quantities and types of materials removed off-Site or handled on-Site, a discussion of removal and disposal options considered for those materials, a listing of the ultimate destination(s) of those materials, a presentation of the analytical results of all sampling and analyses performed, and accompanying appendices containing all relevant documentation generated during the removal action (e.g., manifests, invoices, bills, contracts, and permits). The final report shall also include the following certification signed by a person who supervised or directed the preparation of that report:

"Under penalty of law, I certify that to the best of my knowledge, after appropriate inquiries of all relevant persons involved in the preparation of the report, the information submitted is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Respondent shall submit a separate final report for each Site.

24. Off-Site Shipments.

a. Respondent shall, prior to any off-Site shipment of Waste Material from the Site to an out-of-state waste management facility, provide written notification of such shipment of Waste Material to the appropriate state environmental official in the receiving facility's state and to the On-Scene Coordinator. However, this notification requirement shall not apply to any off-Site shipments when the total volume of all such shipments will not exceed 10 cubic yards.

i. Respondent shall include in the written notification the following information: 1) the name and location of the facility to which the Waste Material is to be shipped; 2) the type and quantity of the Waste Material to be shipped; 3) the expected schedule for the shipment of the Waste Material; and 4) the method of transportation. Respondent shall notify the state in which the planned receiving facility is located of major changes in the shipment plan, such as a decision to ship the Waste Material to another facility within the same state, or to a facility in another state.

ii. The identity of the receiving facility and state will be determined by Respondent following the award of the contract for the removal action. Respondent shall provide the information required by this Paragraph 24(a) and 24(b) as soon as practicable after the award of the contract and before the Waste Material is actually shipped.

b. Before shipping any hazardous substances, pollutants, or contaminants from the Site to an off-site location, Respondent shall obtain U.S. EPA's certification that the proposed receiving facility is operating in compliance with the requirements of CERCLA Section 121(d)(3), 42 U.S.C. § 9621(d)(3), and 40 C.F.R. § 300.440. Respondent shall only send hazardous substances, pollutants, or contaminants from the Site to an off-site facility that complies with the requirements of the statutory provision and regulation cited in the preceding sentence.

IX. SITE ACCESS

25. If any of the Sites, or any other property where access is needed to implement this Settlement Agreement, is owned or controlled by the Respondent, the Respondent shall, commencing on the Effective Date, provide U.S. EPA , the State, and their representatives, including contractors, with access at all reasonable times to the Site, or such other property, for the purpose of conducting any activity related to this Settlement Agreement.

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26. Where any action under this Settlement Agreement is to be performed in areas owned by or in possession of someone other than Respondent, Respondent shall use its best efforts to obtain all necessary access agreements within 20 business days after the Effective Date, or as otherwise specified in writing by the OSC, whichever date is later. Respondent shall immediately notify U.S. EPA if after using its best efforts it is unable to obtain such agreements. For purposes of this Paragraph, "best efforts" includes the payment of reasonable sums of money in consideration of access, though "best efforts" shall not include monetary payments at Sites where the current owner is a potentially responsible party. Respondent shall describe in writing its efforts to obtain access. U.S. EPA may then assist Respondent in gaining access, to the extent necessary to effectuate the response actions described herein, using such means as U.S. EPA deems appropriate. Respondent shall reimburse U.S. EPA for all costs and attorney's fees incurred by the United States in obtaining such access, in accordance with the procedures in Section XV (Payment of Response Costs).

27. Notwithstanding any provision of this Settlement Agreement, U.S. EPA and the State retain all of their access authorities and rights, including enforcement authorities related thereto, under CERCLA, RCRA, and any other applicable statutes or regulations.

X. ACCESS TO INFORMATION

28. Respondent shall provide to U.S. EPA, upon request, copies of all documents and information within its possession or control or that of its contractors or agents relating to activities at any of the Sites or to the implementation of this Settlement Agreement, including, but not limited to, sampling, analysis, chain of custody records, manifests, trucking logs, receipts, reports, sample traffic routing, correspondence, or other documents or information related to the Work. Respondent shall also make available to U.S. EPA, for purposes of investigation, information gathering, or testimony, their employees, agents, or representatives with knowledge of relevant facts concerning the performance of the Work.

29. Respondent may assert business confidentiality claims covering part or all of the documents or information submitted to U.S. EPA under this Settlement Agreement to the extent permitted by and in accordance with Section 104(e)(7) of CERCLA, 42 U.S.C. § 9604(e)(7), and 40 C.F.R. § 2.203(b). Documents or information determined to be confidential by U.S. EPA will be afforded the protection specified in 40 C.F.R. Part 2, Subpart B. If no claim of confidentiality accompanies documents or information when they are submitted to U.S. EPA, or if U.S. EPA has notified Respondent that the documents or information are not confidential under the standards of Section 104(e)(7) of CERCLA or 40 C.F.R. Part 2, Subpart B, the public may be given access to such documents or information without further notice to Respondent.

30. Respondent may assert that certain documents, records and other information are privileged under the attorney-client privilege or any other privilege recognized by federal law. If the Respondent asserts such a privilege in lieu of providing documents, it shall provide U.S. EPA with the following: 1) the title of the document, record, or information; 2) the date of the document, record, or information; 3) the name and title of the author of the document, record, or

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information; 4) the name and title of each addressee and recipient; 5) a description of the contents of the document, record, or information; and 6) the privilege asserted by Respondent. However, no documents, reports or other information created or generated pursuant to the requirements of this Settlement Agreement shall be withheld on the grounds that they are privileged.

31. No claim of confidentiality shall be made with respect to any data, including, but not limited to, all sampling, analytical, monitoring, hydrogeologic, scientific, chemical, or engineering data, or any other documents or information evidencing conditions at or around a Site.

XI. <u>RECORD RETENTION</u>

32. Until 6 years after Respondent's receipt of U.S. EPA's notification pursuant to Section XXIX (Notice of Completion of Work), Respondent shall preserve and retain all non-identical copies of records and documents (including records or documents in electronic form) now in its possession or control or which come into its possession or control that relate in any manner to the performance of the Work or the liability of any person under CERCLA with respect to the Sites, regardless of any corporate retention policy to the contrary. Until 6 years after Respondent's receipt of U.S. EPA's notification pursuant to Section XXIX (Notice of Completion of Work), Respondent shall also instruct its contractors and agents to preserve all documents, records, and information of whatever kind, nature or description relating to performance of the Work.

33. At the conclusion of this document retention period, Respondent shall notify U.S. EPA at least 60 days prior to the destruction of any such records or documents, and, upon request by U.S. EPA, Respondent shall deliver any such records or documents to U.S. EPA. Respondent may assert that certain documents, records and other information are privileged under the attorney-client privilege or any other privilege recognized by federal law. If Respondent asserts such a privilege, it shall provide U.S. EPA with the following: 1) the title of the document, record, or information; 2) the date of the document, record, or information; 3) the name and title of the author of the document, record, or information; 4) the name and title of each addressee and recipient; 5) a description of the subject of the document, record, or information; and 6) the privilege asserted by Respondent. However, no documents, reports or other information created or generated pursuant to the requirements of this Settlement Agreement shall be withheld on the grounds that they are privileged.

34. Respondent hereby certifies that to the best of its knowledge and belief, after thorough inquiry, it has not altered, mutilated, discarded, destroyed or otherwise disposed of any records, documents or other information (other than identical copies) relating to its potential liability regarding any of the Sites since notification of potential liability by U.S. EPA or the State or the filing of suit against it regarding any of the Sites and that it has fully complied and will fully comply with any and all U.S. EPA requests for information pursuant to Sections 104(e) and 122(e) of CERCLA, 42 U.S.C. §§ 9604(e) and 9622(e), and Section 3007 of RCRA, 42 U.S.C.

XII. COMPLIANCE WITH OTHER LAWS

35. Respondent shall perform all actions required pursuant to this Settlement Agreement in accordance with all applicable local, state, and federal laws and regulations except as provided in Section 121(e) of CERCLA, 42 U.S.C. § 6921(e), and 40 C.F.R. §§ 300.400(e) and 300.415(j). In accordance with 40 C.F.R. § 300.415(j), all on-Site actions required pursuant to this Settlement Agreement shall, to the extent practicable, as determined by U.S. EPA, considering the exigencies of the situation, attain applicable or relevant and appropriate requirements ("ARARs") under federal environmental or state environmental or facility siting laws.

XIII. EMERGENCY RESPONSE AND NOTIFICATION OF RELEASES

36. In the event of any action or occurrence during performance of the Work which causes or threatens a release of Waste Material from any of the Sites that constitutes an emergency situation or may present an immediate threat to public health or welfare or the environment, Respondent shall immediately take all appropriate action. Respondent shall take these actions in accordance with all applicable provisions of this Settlement Agreement, including, but not limited to, the Health and Safety Plan, in order to prevent, abate or minimize such release or endangerment caused or threatened by the release. Respondent shall also immediately notify the OSC or, in the event of his/her unavailability, the Regional Duty Officer, Emergency Response Branch, Region 5 at (312) 353-2318, of the incident or Site conditions. In the event that Respondent fails to take appropriate response action as required by this Paragraph, and U.S. EPA takes such action instead, Respondent shall reimburse U.S. EPA all costs of the response action not inconsistent with the NCP pursuant to Section XV (Payment of Response Costs).

37.   In addition, in the event of any release of a hazardous substance from any of the Sites, Respondent shall immediately notify the OSC at (312) 353-2318 and the National Response Center at (800) 424-8802. Respondent shall submit a written report to U.S. EPA within 7 business days after each release, setting forth the events that occurred and the measures taken or to be taken to mitigate any release or endangerment caused or threatened by the release and to prevent the reoccurrence of such a release. This reporting requirement is in addition to, and not in lieu of, reporting under Section 103(c) of CERCLA, 42 U.S.C. § 9603(c), and Section 304 of the Emergency Planning and Community Right-To-Know Act of 1986, 42 U.S.C. § 11004, et seq.

XIV. AUTHORITY OF ON-SCENE COORDINATOR

38. The OSC shall be responsible for overseeing Respondent's implementation of this Settlement Agreement. The OSC shall have the authority vested in an OSC by the NCP, including the authority to halt, conduct, or direct any Work required by this Settlement Agreement, or to direct any other removal action undertaken at the Site. Absence of the OSC from the Site shall not be cause for stoppage of work unless specifically directed by the OSC.

XV. PAYMENT OF RESPONSE COSTS

39. Payments for Future Response Costs.

a. Respondent shall pay U.S. EPA all Future Response Costs not inconsistent with the NCP. On a periodic basis, U.S. EPA will send Respondent a bill requiring payment that consists of an Itemized Cost Summary. Respondent shall make all payments within 30 calendar days of receipt of each bill requiring payment, except as otherwise provided in Paragraph 41 of this Settlement Agreement according to the following procedures.

(i) If the payment amount demanded in the bill is for $10,000 or greater, payment shall be made to U.S. EPA by Electronics Funds Transfer ("EFT") in accordance with current EFT procedures to be provided to Respondent by U.S. EPA Region 5. Payment shall be accompanied by a statement identifying the name and address of the Respondent, the Site name, U.S. EPA Region 5, and the Site/Spill ID Number.

(ii) If the amount demanded in the bill is $10,000 or less, the Respondent may in lieu of the procedures in subparagraph 39(a)(i) make all payments required by this Paragraph by a certified or cashier's check or checks made payable to "EPA Hazardous Substance Superfund," referencing the name and address of the party making the payment, and the EPA Site/Spill ID Number. Respondent shall send the check(s) to:

> U.S. Environmental Protection Agency
> Region 5 Superfund Receivable
> P.O. Box 371099M
> Pittsburgh, PA 15251

For checks sent by express mail:

> Mellon Client Service Center
> Region 5 Superfund Receivable
> ATTN: Shift Supervisor Lockbox 371099M
> 500 Ross Street
> Pittsburgh, PA 15262-0001.

b. At the time of payment, Respondent shall send notice that payment has been made to the Director, Superfund Division, U.S. EPA Region 5, 77 West Jackson Blvd., Chicago, Illinois, 60604-3590 and to Peter Felitti, Associate Regional Counsel, 77 West Jackson Boulevard, C-14J, Chicago, Illinois, 60604-3590.

c. The total amount to be paid by Respondent pursuant to Paragraph 39(a) shall be deposited in the Peoples Gas Special Account within the U.S. EPA Hazardous Substance Superfund to be retained and used to conduct or finance response actions at or in connection with any of the Sites or any of the Sites covered by the EE/CA AOC between U.S. EPA and the Respondent, or to be transferred by U.S. EPA to the U.S. EPA Hazardous Substance Superfund.

40. In the event that the payment for Future Response Costs is not made within 30 days of Respondent's receipt of a bill, Respondent shall pay Interest on the unpaid balance. The Interest on Future Response Costs shall begin to accrue on the date of the bill and shall continue to accrue until the date of payment. Payments of Interest made under this Paragraph shall be in addition to such other remedies or sanctions available to the United States by virtue of Respondent's failure to make timely payments under this Section, including but not limited to, payment of stipulated penalties pursuant to Section XVIII.

41. Respondent may dispute all or part of a bill for Future Response Costs submitted under this Settlement Agreement, only if Respondent alleges that U.S. EPA has made an accounting error, or if Respondent alleges that a cost item is inconsistent with the NCP. If any dispute over costs is resolved before payment is due, the amount due will be adjusted as necessary. If the dispute is not resolved before payment is due, Respondent shall pay the full amount of the uncontested costs to U.S. EPA as specified in Paragraph 39 on or before the due date. Within the same time period, Respondent shall pay the full amount of the contested costs into an interest-bearing escrow account. Respondent shall simultaneously transmit a copy of both checks to the persons listed in Paragraph 39(b) above. Respondent shall ensure that the prevailing party in the dispute shall receive the amount upon which they prevailed from the escrow funds plus interest within 20 calendar days after the dispute is resolved.

XVI. DISPUTE RESOLUTION

42. Unless otherwise expressly provided for in this Settlement Agreement, the dispute resolution procedures of this Section shall be the exclusive mechanism for resolving disputes arising under this Settlement Agreement. The Parties shall attempt to resolve any disagreements concerning this Settlement Agreement expeditiously and informally.

43. If Respondent objects to any U.S. EPA action taken pursuant to this Settlement Agreement, including billings for Future Response Costs, it shall notify U.S. EPA in writing of its objection(s) within 10 calendar days of such action, unless the objection(s) has/have been resolved informally. This written notice shall include a statement of the issues in dispute, the relevant facts upon which the dispute is based, all factual data, analysis or opinion supporting Respondent's position, and all supporting documentation on which such party relies. U.S. EPA

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shall provide its Statement of Position, including supporting documentation, no later than 10 calendar days after receipt of the written notice of dispute. In the event that these 10-day time periods for exchange of written documents may cause a delay in the work, they shall be shortened upon, and in accordance with, notice by U.S. EPA. The time periods for exchange of written documents relating to disputes over billings for response costs may be extended at the sole discretion of U.S. EPA. An administrative record of any dispute under this Section shall be maintained by U.S. EPA. The record shall include the written notification of such dispute, and the Statement of Position served pursuant to the preceding paragraph. Upon review of the administrative record, the Director of the Superfund Division, U.S. EPA Region 5, shall resolve the dispute consistent with the NCP and the terms of this Settlement Agreement.

44. Respondent's obligations under this Settlement Agreement shall not be tolled by submission of any objection for dispute resolution under this Section. Following resolution of the dispute, as provided by this Section, Respondent shall fulfill the requirement that was the subject of the dispute in accordance with the agreement reached or with U.S. EPA's decision, whichever occurs.

XVII. FORCE MAJEURE

45. Respondent agrees to perform all requirements of this Settlement Agreement within the time limits established under this Settlement Agreement, unless the performance is delayed by a force majeure. For purposes of this Settlement Agreement, a force majeure is defined as any event arising from causes beyond the control of Respondent, or of any entity controlled by Respondent, including but not limited to their contractors and subcontractors, which delays or prevents performance of any obligation under this Settlement Agreement despite Respondent's best efforts to fulfill the obligation. Force majeure does not include financial inability to complete the Work or increased cost of performance.

46. If any event occurs or has occurred that may delay the performance of any obligation under this Settlement Agreement, whether or not caused by a force majeure event, Respondent shall notify U.S. EPA orally within 24 hours of when Respondent first knew that the event might cause a delay. Within 7 calendar days thereafter, Respondent shall provide to U.S. EPA in writing an explanation and description of the reasons for the delay; the anticipated duration of the delay; all actions taken or to be taken to prevent or minimize the delay; a schedule for implementation of any measures to be taken to prevent or mitigate the delay or the effect of the delay; Respondent's rationale for attributing such delay to a force majeure event if they intend to assert such a claim; and a statement as to whether, in the opinion of Respondent, such event may cause or contribute to an endangerment to public health, welfare or the environment. Failure to comply with the above requirements shall be grounds for U.S. EPA to deny Respondent an extension of time for performance. Respondent shall have the burden of demonstrating by a preponderance of the evidence that the event is a force majeure, that the delay is warranted under the circumstances, and that best efforts were exercised to avoid and mitigate the effects of the delay.

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47. If U.S. EPA agrees that the delay or anticipated delay is attributable to a force majeure event, the time for performance of the obligations under this Settlement Agreement that are affected by the force majeure event will be extended by U.S. EPA for such time as is necessary to complete those obligations. An extension of the time for performance of the obligations affected by the force majeure event shall not, of itself, extend the time for performance of any other obligation. If U.S. EPA does not agree that the delay or anticipated delay has been or will be caused by a force majeure event, U.S. EPA will notify Respondent in writing of its decision. If U.S. EPA agrees that the delay is attributable to a force majeure event, U.S. EPA will notify Respondent in writing of the length of the extension, if any, for performance of the obligations affected by the force majeure event.

XVIII. STIPULATED PENALTIES

48. Respondent shall be liable to U.S. EPA for stipulated penalties in the amounts set forth in Paragraph 49 for failure to comply with the requirements of this Settlement Agreement specified below, unless excused under Section XVII (Force Majeure). "Compliance" by Respondent shall include completion of the activities under this Settlement Agreement or any work plan or other plan approved under this Settlement Agreement identified below in accordance with all applicable requirements of this Settlement Agreement within the specified time schedules established by and approved under this Settlement Agreement.

49. Stipulated Penalty Amounts.

Deliverable/Activity	Penalty for Days 1 - 7	Penalty for > 7 Days
Late submittal of Progress Reports or other miscellaneous Reports/Submittals	$250/day	$500/day
Failure to meet any other scheduled Deadline in the AOC,or Work Plans	$250/day	$500/day

50. All penalties shall begin to accrue on the day after the complete performance is due or the day a violation occurs, and shall continue to accrue through the final day of the correction of the noncompliance or completion of the activity. However, stipulated penalties shall not accrue: 1) with respect to a deficient submission under Section VIII (Work to be Performed), during the period, if any, beginning on the 31st day after U.S. EPA's receipt of such submission until the date that U.S. EPA notifies Respondent of any deficiency; and 2) with respect to a decision by the Director of the Superfund Division, Region 5, under Paragraph 43 of Section XVI (Dispute Resolution), during the period, if any, beginning on the 21st day after U.S. EPA submits its written statement of position until the date that the Director of the Superfund Division

issues a final decision regarding such dispute. Nothing herein shall prevent the simultaneous accrual of separate penalties for separate violations of this Settlement Agreement.

51. Following U.S. EPA's determination that Respondent has failed to comply with a requirement of this Settlement Agreement, U.S. EPA may give Respondent written notification of the failure and describe the noncompliance. U.S. EPA may send Respondent a written demand for payment of the penalties. However, penalties shall accrue as provided in the preceding Paragraph regardless of whether U.S. EPA has notified Respondent of a violation.

52. All penalties accruing under this Section shall be due and payable to U.S. EPA within 30 days of Respondent's receipt from U.S. EPA of a demand for payment of the penalties, unless Respondent invokes the dispute resolution procedures under Section XVI (Dispute Resolution). All payments to U.S. EPA under this Section shall be paid by certified or cashier's check(s) made payable to "U.S. EPA Hazardous Substances Superfund," shall be mailed to U.S. Environmental Protection Agency, Region 5 Superfund Receivable, P.O. Box 371531, Pittsburgh, PA 15251-7531, shall indicate that the payment is for stipulated penalties, and shall reference the U.S. EPA Site/Spill ID Number, the U.S. EPA Docket Number, and the name and address of the Respondent. Copies of check(s) paid pursuant to this Section, and any accompanying transmittal letter(s), shall be sent to U.S. EPA as provided in Paragraph 39(b).

53. The payment of penalties shall not alter in any way Respondent's obligation to complete performance of the Work required under this Settlement Agreement.

54. Penalties shall continue to accrue during any dispute resolution period, but need not be paid until 20 days after the dispute is resolved by agreement or by receipt of U.S. EPA's decision.

55. If Respondent fails to pay stipulated penalties when due, U.S. EPA may institute proceedings to collect the penalties, as well as Interest. Respondent shall pay Interest on the unpaid balance, which shall begin to accrue on the date of demand made pursuant to Paragraph 51. Nothing in this Settlement Agreement shall be construed as prohibiting, altering, or in any way limiting the ability of U.S. EPA to seek any other remedies or sanctions available by virtue of Respondent's violation of this Settlement Agreement or of the statutes and regulations upon which it is based, including, but not limited to, penalties pursuant to Sections 106(b) and 122(l) of CERCLA, 42 U.S.C. §§ 9606(b) and 9622(l), and punitive damages pursuant to Section 107(c)(3) of CERCLA, 42 U.S.C. § 9607(c)(3). Provided, however, that U.S. EPA shall not seek civil penalties pursuant to Section 106(b) or 122(l) of CERCLA or punitive damages pursuant to Section 107(c)(3) of CERCLA for any violation for which a stipulated penalty is provided herein, except in the case of a willful violation of this Settlement Agreement. Should Respondent violate this Settlement Agreement or any portion hereof, U.S. EPA may carry out the required actions unilaterally, pursuant to Section 104 of CERCLA, 42 U.S.C. § 9604, and/or may seek judicial enforcement of this Settlement Agreement pursuant to Section 106 of CERCLA, 42 U.S.C. § 9606. Notwithstanding any other provision of this Section, U.S. EPA may, in its

unreviewable discretion, waive in writing any portion of stipulated penalties that have accrued pursuant to this Settlement Agreement.

XIX. <u>COVENANT NOT TO SUE BY U.S. EPA</u>

56. In consideration of the actions that will be performed and the payments that will be made by Respondent under the terms of this Settlement Agreement, and except as otherwise specifically provided in this Settlement Agreement, U.S. EPA covenants not to sue or to take administrative action against Respondent pursuant to Sections 106 and 107(a) of CERCLA, 42 U.S.C. §§ 9606 and 9607(a), for the Work and Future Response Costs. This covenant not to sue shall take effect upon the Effective Date and is conditioned upon the complete and satisfactory performance by Respondent of all obligations under this Settlement Agreement, including, but not limited to, payment of Future Response Costs pursuant to Section XV. This covenant not to sue extends only to Respondent and does not extend to any other person.

XX. <u>RESERVATIONS OF RIGHTS BY U.S. EPA</u>

57. Except as specifically provided in this Settlement Agreement, nothing herein shall limit the power and authority of U.S. EPA or the United States to take, direct, or order all actions necessary to protect public health, welfare, or the environment or to prevent, abate, or minimize an actual or threatened release of hazardous substances, pollutants or contaminants, or hazardous or solid waste on, at, or from the Site. Further, nothing herein shall prevent U.S. EPA from seeking legal or equitable relief to enforce the terms of this Settlement Agreement. U.S. EPA also reserves the right to take any other legal or equitable action as it deems appropriate and necessary, or to require the Respondent in the future to perform additional activities pursuant to CERCLA or any other applicable law.

58. The covenant not to sue set forth in Section XIX above does not pertain to any matters other than those expressly identified therein. U.S. EPA reserves, and this Settlement Agreement is without prejudice to, all rights against Respondent with respect to all other matters, including, but not limited to:

a. claims based on a failure by Respondent to meet a requirement of this Settlement Agreement;

b. liability for costs not included within the definition of Future Response Costs;

c. liability for performance of response action other than the Work, including but not limited to conducting an EE/CA on each Site;

d. criminal liability;

e. liability for damages for injury to, destruction of, or loss of natural resources, and for the costs of any natural resource damage assessments;

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f. liability arising from the past, present, or future disposal, release or threat of release of Waste Materials outside any of the Sites; and

g. liability for costs incurred or to be incurred by the Agency for Toxic Substances and Disease Registry related any of the Sites.

XXI. COVENANT NOT TO SUE BY RESPONDENT

59. Respondent covenants not to sue and agrees not to assert any claims or causes of action against the United States, or its contractors or employees, with respect to the Work, Future Response Costs, or this Settlement Agreement, including, but not limited to:

a. any direct or indirect claim for reimbursement from the Hazardous Substance Superfund established by 26 U.S.C. § 9507, based on Sections 106(b)(2), 107, 111, 112, or 113 of CERCLA, 42 U.S.C. §§ 9606(b)(2), 9607, 9611, 9612, or 9613, or any other provision of law;

b. any claim arising out of response actions at or in connection with the Site, including any claim under the United States Constitution, the Illinois Constitution, the Tucker Act, 28 U.S.C. § 1491, the Equal Access to Justice Act, 28 U.S.C. § 2412, as amended, or at common law; or

c. any claim against the United States pursuant to Sections 107 and 113 of CERCLA, 42 U.S.C. §§ 9607 and 9613, relating to the Site.

60. Nothing in this Agreement shall be deemed to constitute approval or preauthorization of a claim within the meaning of Section 111 of CERCLA, 42 U.S.C. § 9611, or 40 C.F.R. § 300.700(d).

XXII. OTHER CLAIMS

61. By issuance of this Settlement Agreement, the United States and U.S. EPA assume no liability for injuries or damages to persons or property resulting from any acts or omissions of Respondent. The United States or U.S. EPA shall not be deemed a party to any contract entered into by Respondent or its directors, officers, employees, agents, successors, representatives, assigns, contractors, or consultants in carrying out actions pursuant to this Settlement Agreement.

62. Nothing in this Settlement Agreement constitutes a satisfaction of or release from any claim or cause of action against Respondent or any person not a party to this Settlement Agreement, for any liability such person may have under CERCLA, other statutes, or common law, including but not limited to any claims of the United States for costs, damages and interest under Sections 106 and 107 of CERCLA, 42 U.S.C. §§ 9606 and 9607.

63.   No action or decision by U.S. EPA pursuant to this Settlement Agreement shall give rise to any right to judicial review, except as set forth in Section 113(h) of CERCLA, 42 U.S.C. § 9613(h).

XXIII. CONTRIBUTION

64. a.   The Parties agree that this Settlement Agreement constitutes an administrative settlement for purposes of Section 113(f)(2) of CERCLA, 42 U.S.C. § 9613(f)(2), and that Respondent is entitled, as of the Effective Date, to protection from contribution actions or claims as provided by Sections 113(f)(2) and 122(h)(4) of CERCLA, 42 U.S.C. §§ 9613(f)(2) and 9622(h)(4), for "matters addressed" in this Settlement Agreement. The "matters addressed" in this Settlement Agreement are the Work and Future Response Costs.

b.   The Parties agree that this Settlement Agreement constitutes an administrative settlement for purposes of Section 113(f)(3)(B) of CERCLA, 42. U.S.C. § 9613(f)(3)(B), pursuant to which the Respondent has, as of the Effective Date, resolved its liability to the United States for the Work and Future Response Costs.

XXIV. INDEMNIFICATION

65. Respondent shall indemnify, save and hold harmless the United States, its officials, agents, contractors, subcontractors, employees and representatives from any and all claims or causes of action arising from, or on account of, negligent or other wrongful acts or omissions of Respondent, its officers, directors, employees, agents, contractors, or subcontractors, in carrying out actions pursuant to this Settlement Agreement. In addition, Respondent agrees to pay the United States all costs incurred by the United States, including but not limited to attorneys fees and other expenses of litigation and settlement, arising from or on account of claims made against the United States based on negligent or other wrongful acts or omissions of Respondent, its officers, directors, employees, agents, contractors, subcontractors and any persons acting on its behalf or under its control, in carrying out activities pursuant to this Settlement Agreement. The United States shall not be held out as a party to any contract entered into by or on behalf of Respondent in carrying out activities pursuant to this Settlement Agreement. Neither Respondent nor any such contractor shall be considered an agent of the United States. The Federal Tort Claims Act (28 U.S.C. §§ 2671, 2680) provides coverage for injury or loss of property, or injury or death caused by the negligent or wrongful act or omission of an employee of U.S. EPA while acting within the scope of his or her employment, under circumstances where U.S. EPA, if a private person, would be liable to the claimant in accordance with the law of the place where the act or omission occurred.

66. The United States shall give Respondent notice of any claim for which the United States plans to seek indemnification pursuant to this Section and shall consult with Respondent prior to settling such claim.

67. Respondent waives all claims against the United States for damages or reimbursement or for set-off of any payments made or to be made to the United States, arising from or on account of any contract, agreement, or arrangement between Respondent and any person for performance of Work on or relating to any of the Sites, including, but not limited to, claims on account of construction delays. In addition, Respondent shall indemnify and hold harmless the United States with respect to any and all claims for damages or reimbursement arising from or on account of any contract, agreement, or arrangement between Respondent and any person for performance of Work on or relating to any of the Sites, including, but not limited to, claims on account of construction delays.

XXV. MODIFICATIONS

68. The OSC may make modifications to any plan or schedule in writing or by oral direction. Any oral modification will be memorialized in writing by U.S. EPA promptly, but shall have as its effective date the date of the OSC's oral direction. Any other requirements of this Settlement Agreement may be modified in writing by mutual agreement of the parties.

69. If Respondent seeks permission to deviate from any approved work plan or schedule, Respondent's Project Coordinator shall submit a written request to U.S. EPA for approval outlining the proposed modification and its basis. Respondent may not proceed with the requested deviation until receiving oral or written approval from the OSC pursuant to Paragraph 68.

70. No informal advice, guidance, suggestion, or comment by the OSC or other U.S. EPA representatives regarding reports, plans, specifications, schedules, or any other writing submitted by Respondent shall relieve Respondent of its obligation to obtain any formal approval required by this Settlement Agreement, or to comply with all requirements of this Settlement Agreement, unless it is formally modified.

XXVI. NOTICE OF COMPLETION OF WORK

71. When U.S. EPA determines, after U.S. EPA's review of the Final Report, that all Work has been fully performed in accordance with this Settlement Agreement, with the exception of any continuing obligations required by this Settlement Agreement, including, e.g., post-removal site controls, payment of Future Response Costs, and record retention, U.S. EPA will provide written notice to Respondent. If U.S. EPA determines that any such Work has not been completed in accordance with this Settlement Agreement, U.S. EPA will notify Respondent, provide a list of the deficiencies, and require that Respondent modify the Work Plan if appropriate in order to correct such deficiencies. Respondent shall implement the modified and approved Work Plan and shall submit a modified Final Report in accordance with the U.S. EPA notice. Failure by Respondent to implement the approved modified Work Plan shall be a violation of this Settlement Agreement.

XXVII. SEVERABILITY/INTEGRATION/ATTACHMENTS

72. If a court issues an order that invalidates any provision of this Settlement Agreement or finds that Respondent has sufficient cause not to comply with one or more provisions of this Settlement Agreement, Respondent shall remain bound to comply with all provisions of this Settlement Agreement not invalidated or determined to be subject to a sufficient cause defense by the court's order.

73. This Settlement Agreement and its attachments constitute the final, complete and exclusive agreement and understanding among the Parties with respect to the settlement embodied in this Settlement Agreement. The parties acknowledge that there are no representations, agreements or understandings relating to the settlement other than those expressly contained in this Settlement Agreement. The following attachments are incorporated into this Settlement Agreement:

Appendix 1- Maps of the Sites
Appendix 2- Work Plan for 22nd Street Station Site
Appendix 3- Work Plan for Hough Place Station Site
Appendix 4- Work Plan for Pitney Court Station Site

XXVIII. EFFECTIVE DATE

74. This Settlement Agreement shall be effective upon signature by the Director, Superfund Division, U.S. EPA Region 5.

The undersigned representative of the Respondent certifies that he/she is fully authorized to enter into the terms and conditions of this Settlement Agreement and to bind the party they represent to this document.

Agreed this _____ day of _____, 2007.

For Respondent   Peoples Gas

By

Title _____

Desirée G. Rogers, President
Peoples Gas

IN THE MATTER OF:

Peoples Gas
Manufactured Gas Plant Sites
Chicago, Cook County, Illinois

It is so ORDERED and Agreed this __5th__ day of __JUNE__, 2007.

BY: _____
Richard C. Karl, Director
Superfund Division
United States Environmental Protection Agency
Region 5

28

APPENDIX 1

SITE LOCATION

NORTH

2000   0   2000   4000

APPROXIMATE SCALE IN FEET

Burns & McDonnell
SINCE 1898
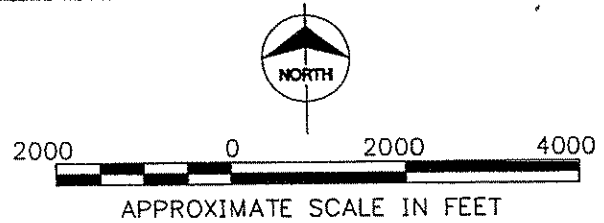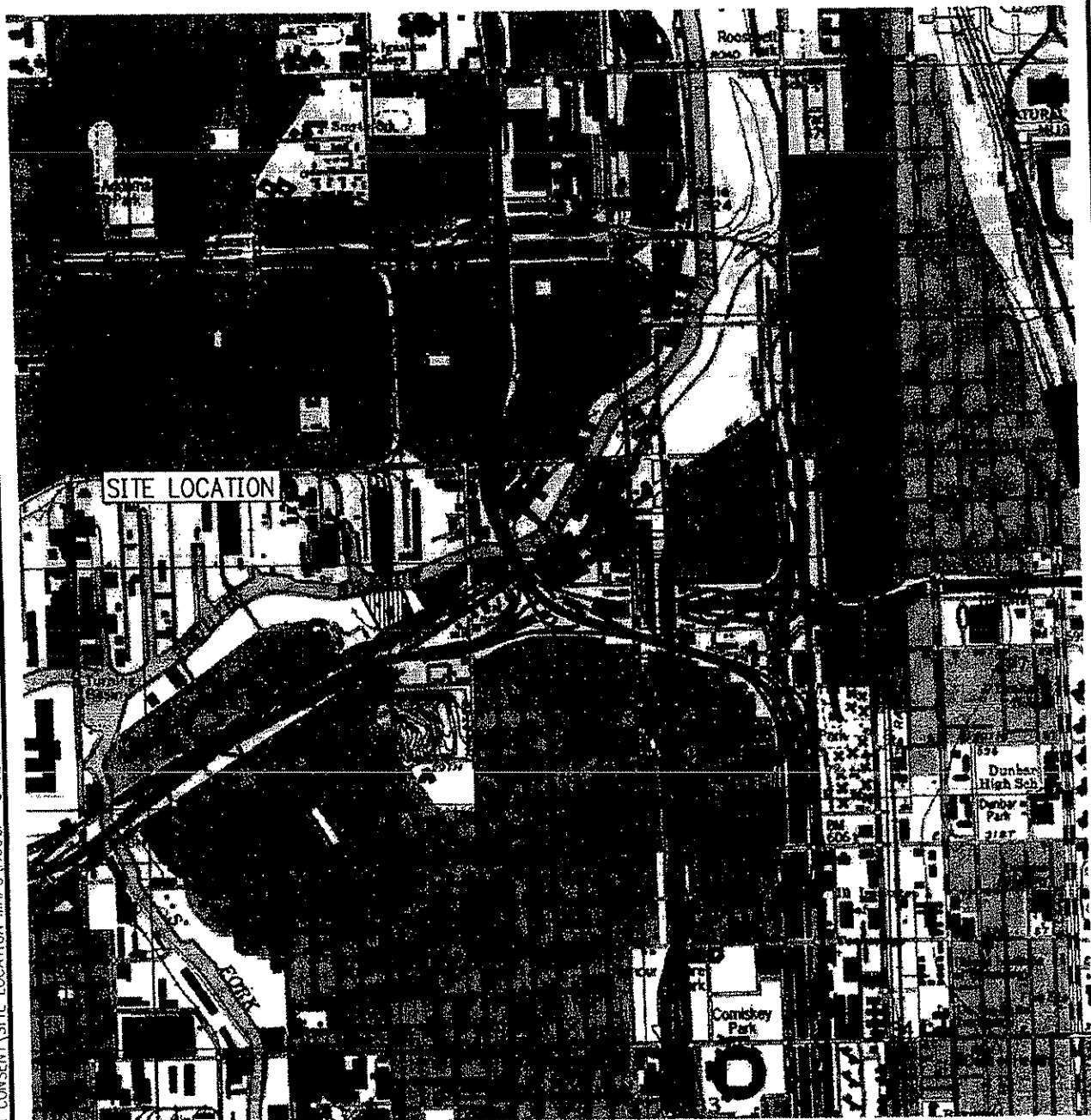
THE PEOPLES GAS
LIGHT AND COKE COMPANY
CHICAGO, ILLINOIS

SITE LOCATION MAP
FORMER HOUGH PLACE STATION SITE
CHICAGO, ILLINOIS

SITE
LOCATION

MC KINLEY PARK

NORTH
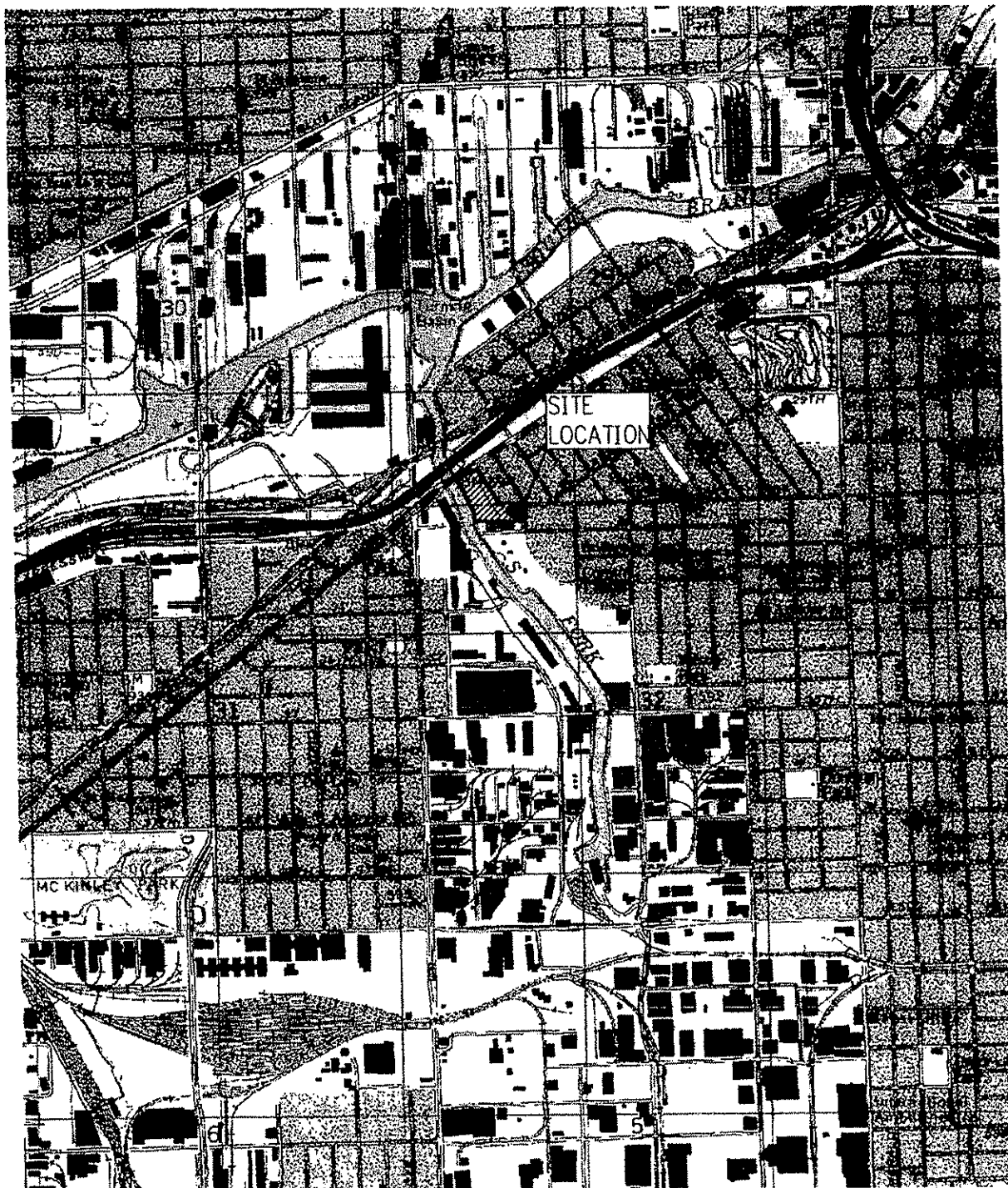
1800   0   1800   3600

APPROXIMATE SCALE

Burns &
McDonnell
SINCE 1898

SITE LOCATION
FORMER PITNEY COURT SITE
CHICAGO, ILLINOIS

DRAFT
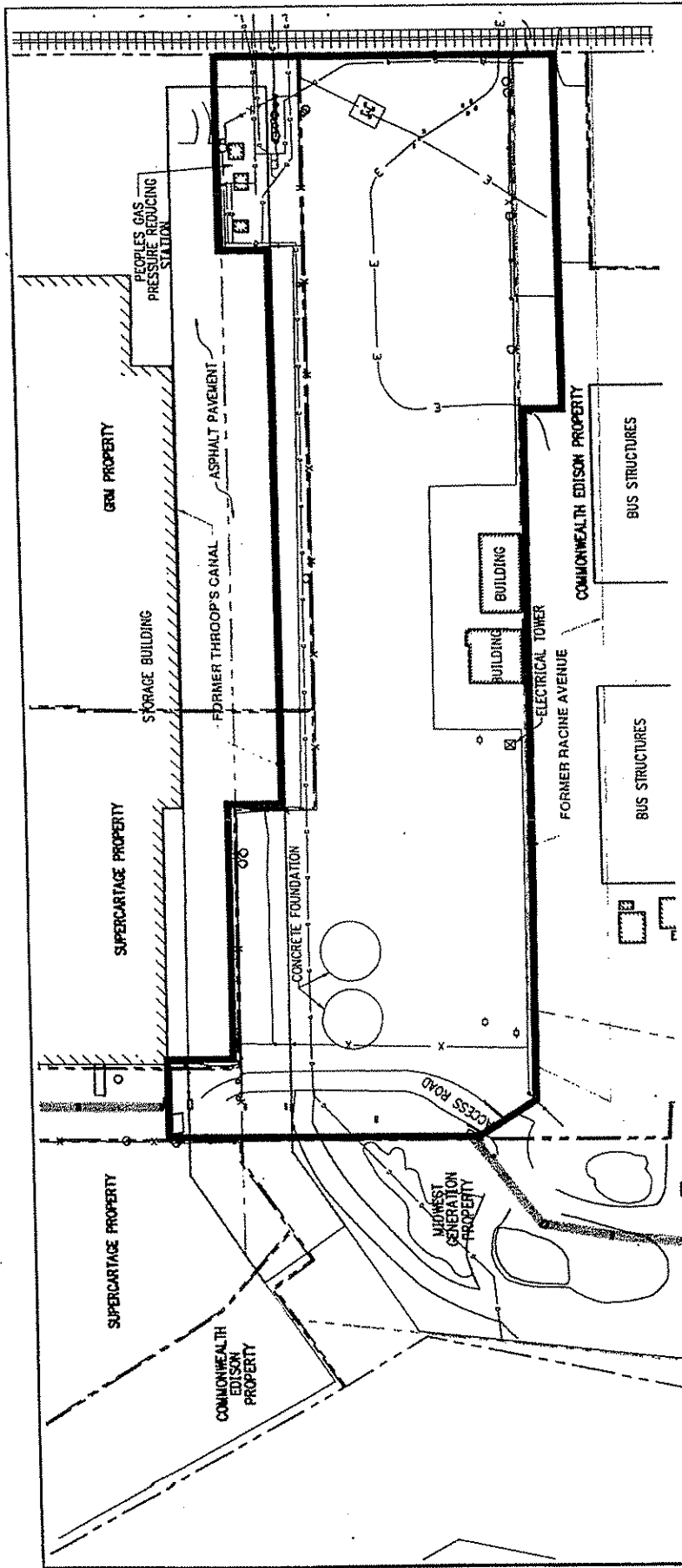
LEGEND

—x—	FENCE
▨	FORMER MGP SITE
▦	EXISTING BUILDING
▥	RAILROAD TRACKS
—e—	UNDERGROUND ELECTRICAL LINES
—g—	GAS LINE
⊸	POWER POLE
⊙E	ELECTRICAL MANHOLE
✕	LIGHT POLE

— — —	GRM PROPERTY LINE
— — —	SUPERCARTAGE PROPERTY LINE
— — —	COMED PROPERTY LINE
— — —	MIDWEST GENERATION PROPERTY
▨▨▨	OVERHEAD PIPE RACK
▬▬▬	PHASE I WORK AREA

NORTH

SCALE IN FEET

80   0   80   160
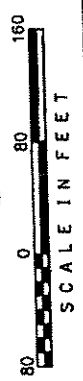
THE PEOPLES GAS
LIGHT AND COKE COMPANY
CHICAGO, ILLINOIS

PHASE I WORK AREA
22ND STREET STATION–COMED PROPERTY
CHICAGO, ILLINOIS

SUPERCARTAGE PROPERTY

COMMONWEALTH EDISON PROPERTY

SUPERCARTAGE PROPERTY

MIDWEST GENERATION PROPERTY

GRM PROPERTY

STORAGE BUILDING

PEOPLES GAS PRESSURE REDUCING STATION

ASPHALT PAVEMENT

FORMER THROOP'S CANAL

CONCRETE FOUNDATION

ACCESS ROAD

ELECTRICAL TOWER

FORMER RACINE AVENUE

COMMONWEALTH EDISON PROPERTY

BUILDING

BUILDING

BUS STRUCTURES

BUS STRUCTURES

BUS STRUCTURES

Case Conclusion Data Sheet

Please click here for instructions for completing the form

Program Contact: Tom Cook
Phone: 6-7182

ORC Attorney: Peter Felitti
Phone: 6-5114

Status: ☒ Draft   ☐ Final   ☐ Update

CASE BACKGROUND
1.   ICIS Enforcement Activity Number:
2.   Regional Hearing Clerk Docket Number:
3.   Program Docket Number:

4.   Judicial Court Docket Number:
*5.   Case Name (Add Defendants if other than case name)   IN THE MATTER OF:
Peoples Gas Manufactured Gas Plant Sites Removal
        Additional Defendants :

FACILITY INFORMATION
6.   EPA Program Facility ID:
*7.   Facility Name: the 22nd Street Station ("22nd Street Station Site") located at 2200 South Racine Avenue, Chicago, Illinois; the Hough Place Station ("Hough Place Station Site") located at 2500 S. Corbett St., Chicago, Illinois; and the Pitney Court Station ("Pitney Court Station Site") located at 3052 Pitney Court, Chicago, Illinois
*8.   Facility Street Address:
        City, State, Zipcode: chicago,   IL
        County: Cook

*9.   Primary 4-digit NAICS/SICCode:
10.   Other 4-digit NAICS/SIC codes:

STATUTES AND AUTHORIZING SECTION INFORMATION
        *Media Program   CERCLA
*11.   Statute(s) and Section(s) Violated: CERCLA 107
*12.   Authorizing Section for Administrative Actions: CERCLA 106
        *Violation Type :

ACTION TYPE
*13.   Action Type: Administrative compliance order (AOC/UAO/PPA)
14a.   ALJ Decision :
14b.   EAB Appeal Date :
14c.   EAB Decision Date :
*16.   Administrative Compliance Order Date:
*16a.   Notice of Determination Date:

*16b.   Field Citation Date:
16c.   Notice of Violation Date:

17.   Civil Judical Referral Date:

18.   Civil Judicial Complaint Filed:
19.   Consent Decree Lodge Date:
*20.   Consent Decree Entry Date:

21.   Was this a multi-media action?   ○ Yes ● No

23.   Was this action part of a geographic initiative: ○ Yes ● No
24.   Which (Check all that apply)?

24a.   Priority/Sector
25.   Was this Agency activity taken in response to Environmental Justice Concerns? ○ Yes ● No
26.   Is this a Small Business?   ○ Yes ● No
26a.   Was this a self-disclosure?   ○ Yes ● No
27.   Was Alternative Dispute Resolution used in this action?   ○ Yes ● No

QUALITATIVE AND QUANTITATIVE INFORMATION

*28.   Injunctive Relief/Compliance Activity: Include both actions completed prior to final
settlement/order and actions to be taken by violator to return to compliance or meet additional
requirements. Select responses from the following list. At least one action must be chosen:

*29.   Provide Description of Injunctive Relief/Compliance Activity:
The Respondent will conduct a removal of contaminated soil at three sites

*30.   Cost of actions described in previous question (Actual cost data supplied by violator is preferred
figure)
Physical actions: Non-Physical Actions:

31.   Acres in Violation:

32.   Quantitative environmental impact of injunctive relief/compliance actions described in previous
questions:
    REDUCTIONS/ELIMINATIONS:

*Pollutant/Land Use *Amount	*Units/Acres (Express in annual amounts)	*Percent% (of pollutant reduced/removed)	*Media

SUPPLEMENTAL ENVIRONMENTAL PROJECTS (SEPs)
33.   Categories of SEP (check all the appropriate categories)

☐ Public Health
☐ Pollution Prevention
☐ (1) equipment technology modifications
☐ (2) process/procedure modification
☐ (3) product reformulation/redesign
☐ (4) raw material substitution
☐ (5) improved housekeeping/O&M/training/inventory control
☐ (6) in-process recycling
☐ (7) energy efficiency/conservation
☐ Pollution reduction
☐ Environmental restoration and protection
☐ Assessments and audits
☐ Environmental compliance promotion
☐ Emergency planning and preparedness
☐ Other SEP category (specify)

Does SEP address any of the Region 5 Environmental Priorities

☐ Toxics Reduction   ☐ Sediment cleanup
☐ Brownfields Redevelopment   ☐ Ozone air quaility standards attainment
☐ Environmental justice   ☐ Critical·habitat protection and restoration

34.   SEP Description:

35.   Cost of SEP (Cost Calculated by the PROJECT Model is preferred):

36.   Quantitative environmental impact of SEP; pollutants and/or chemicals and/or waste streams and amount of reductions/eliminations (e.g., emission/discharges):

Pollutant	Amount	Units	Percent% (of pollutant reduced/removed)	Media

PENALTY

37.   Proposed Penalty:

38.   Assessed Penalty:

39.   If Shared Federal Share:

40.   If Shared State or Local Share:

41.   For multi-media actions: Federal amounts by Statute

Statute	Amount	
CAA		

*PLEASE ADD ADDITIONAL INFORMATION, INCLUDING SHORT CASE SUMMARY:

DOCUMENT HISTORY

Document Author: Peter Felitti   05/11/2007 08:48:29 AM

Edit History: Last 5 Editors   Edit Date & Time

05/11/2007   4   08:52:05 AM

GREMLEY & BIEDERMANN, INC.

PROFESSIONAL ILLINOIS LAND SURVEYORS

4505 N. Elston Avenue   Chicago, Illinois 60630
Telephone: (773) 685–5102   Fax: (773) 286–4184
Illinois Land Surveyor Corporation No. 16
License No. 184–002761

Plat of Survey

Lots 51 to 57, both inclusive, Lots 59 to 67, both inclusive, and Lots 68 to 76, both inclusive, (except the South 47 feet of said Lots 68 to 76); also the alley or strip of land 16 feet, more or less, in width, lying between and bounded by said Lots 59 to 67 on the North and by said Lots 68 to 76 on the South; also that part of Pitney Court lying between and bounded by said Lots 54 to 57on the West and said Lot 59, said alley or strip of land 16 feet in width, and said Lot 76 on the East, as lies North of the South line of said Lot 57, extended East, and South of the North line of said Lot 59, extended West; also that part of Pitney Court and 31st Street, lying East of and adjoining said Lots 54 and 55, North of the North line of said Lot 59, extended West and Southwesterly of the Westerly line of Pitney Court as established, North of 31st Street, extended Southeasterly, all in Broad and Pitney's subdivision of Block 30 and of Lot 2 in Block 29 in Canal Trustees' Subdivision of the South Fraction of Section 29 and also of 4.84 acres in the Northeast corner of the West Half of the Northwest Quarter of Section 32, all in Township 39 North, Range 14, East of the Third Principal Meridian, together with all of the right, title and interest of the owner in and to any and all property adjacent thereto and lying within the streets, alleys and waterways adjoining said premises. Excepting from the foregoing, a part of Lot 51 heretofore conveyed by Marblehead Lime Company to the city of Chicago, by deed dated June 15, 1961 recorded April 6, 1962 as document 18442196 and described as follows: That part of Lot 51 in Broad and Pitney's Subdivision of Block 30 and of Lot 2 in Block 29 in Canal Trustees' Subdivision of the South Fraction of Section 29, Township 39 North, Range 14, East of the Third Principal Meridian, described as follows: beginning at a point in the Southerly street line of Archer Avenue, said point being 63.36 feet Westerly of the Westerly street line of Pitney Court, as measured along the Southerly street line of Archer Avenue; Thence We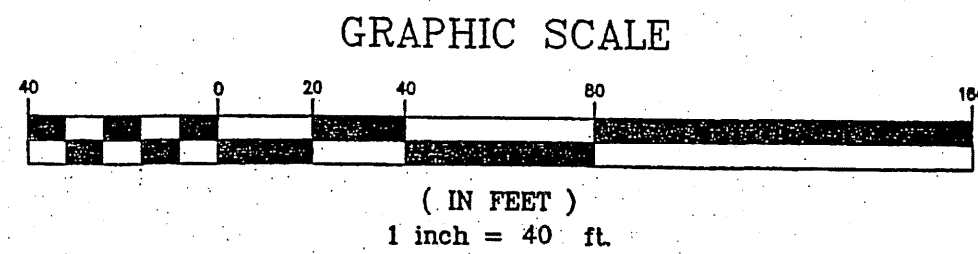sterly along a line forming an angle of 2° 30' 23" with the Southerly street line of Archer Avenue, measured from Westerly to Southwesterly, a distance of 132.23 feet; Thence Southerly at right angles to the last described line, a distance of 0.75 feet; Thence Westerly at right angles to the last described line, a distance of 38.58 feet (more or less) to the Westerly line of Lot 51; Thence Northerly along the Westerly line of Lot 51, a distance of 8.25 feet (more or less) to the Southerly street line of Archer Avenue; Thence Easterly along the Southerly street line of Archer Avenue, a distance of 169.88 feet, more or less, to the point of beginning, in Cook County, Illinois.

Further being described as: beginning at the intersection of the South line of West 31st Street with the West line of Benson Street; Thence South 00° 00' 00" East along the West line of Benson Street 199.85 feet; Thence North 89° 19' 20" West 555.79 feet to the East line of the South Branch of the Chicago River as occupied; Thence North 07° 32' 36" West along said East line 224.69 feet to a bend in said East line; Thence continuing North 27° 13' 38" West along said East line 354.34 feet to the Southerly line of Archer Avenue as widened; Thence North 53° 16' 25" East along the last described line 43.48 feet; Thence North 36° 43' 35" West 0.75 feet; Thence North 53° 16' 25" East along the Southerly line of Archer Avenue as widened 132.23 feet; Thence North 55° 46' 48" East along the Southerly line of Archer Avenue 63.36 feet to the Southwesterly line of Pitney Court; Thence South 31° 27' 03" East along said Southwesterly line and its Southeasterly extension 569.43 feet to the Westerly extension of the South line of West 31st Street; Thence South 89° 59' 00" East along said extension and the South line for a distance of 257.48 feet to the point of beginning, in Cook County, Illinois.

LEGEND

Symbol	Description
	Water Meter
	Water Fire Hydrant
	Telephone Pole
	Telephone MH
	Telephone Vault
	Telephone Pedestal
	Electric Utility Pole
	Electric MH
	Electric Vault
	Electric Meter
	Electric Pad
	Electric Pedestal
	Electric Light Pole
	Electric Traffic Signal
	Electric Light Pole with Traffic Signal
	Electric Traffic Control Box
	Gas Valve
	Gas MH
	Gas Vault
	Gas Buffalo Box
	Cable TV/Pedestal
	Storm MH
	Storm CB
	Storm Inlet
	San MH
	San Clean Out
	Water Valve Vault
	Water MH
	Water Buffalo Box
	Water Hand Hole
	Tree – Deciduous
	Tree – Evergreen
	Parking Meter
	Sign Post
	Mail Box
	Bumper Post
	Guy Anchor
	Soil Boring
	Monumentation Found
	Monumentation Established
	Unclassified Manhole

A.=ASPHALT ELEVATION
FFE.=FINISHED FLOOR ELEVATION
W.=WALK ELEVATION
X.=CONCRETE ELEVATION
C.=CURB ELEVATION
G.=GUTTER ELEVATION
EL.=ELEVATION

SITE BENCHMARK
CROSS FOUND 5.00' NORTH & 5.00' EAST EL.=12.49'

BENCHMARK # 4642
ELEVATION = 16.243

LOCATION: S. ASHLAND & S. ARCHER

ABOUT 78' WESTERLY OF THE WEST LINE OF S. ASHLAND.
ABOUT ON SOUTHERLY LINE OF S. ARCHER.
MARK CUT AT NORTHWESTERLY CORNER OF STONE WINDOW SILL ON NORTHERLY SIDE OF 1 STORY BUILDING, 9.5' WESTERLY OF NORTHEASTERLY CORNER OF BUILDING & 3.1' ABOVE WALK.

UTILITY WARNING

The underground utilities shown have been located from field survey information and existing drawings. The surveyor makes NO guarantee that the underground utilities shown comprise all such utilities in the area, either in service or abandoned. The surveyor further does not warrant that the underground utilities shown are in the exact location indicated although he does certify that they are located as accurately as possible from information available. The surveyor has not physically located the underground utilities.

Call DIGGER – (312) 744–7000 within the City of Chicago.

Outside of the City of Chicago call J.U.L.I.E. (800) 892–0123 prior to construction or excavation.

THE CITY OF CHICAGO BOARD OF UNDERGROUND INVOLVEMENT HAS BEEN REQUESTED FOR YOUR SURVEY. THE RESULTS TO DATE ARE INDICATED BELOW. AS A CONVENIENCE TO YOU THE UTILITY DATA IS REVIEWED AND ADDED TO THIS PLAT AS IT IS RECEIVED. THESE RECORDS ARE THEN FORWARDED TO YOU. PLEASE BE AWARE THAT NO OTHER COPY OF THIS INFORMATION IS RETAINED.

X - INVOLVED.   N - NOT INVOLVED.   BLANK - NOT RECEIVED.

- X 1. SBC (AMERITECH)
- 2. AT&T BROADBAND
- X 3. BUREAU OF ELECTRICITY
- X 4. BUREAU OF STREETS
- X 5. BUREAU OF TRAFFIC
- N 6. BUREAU OF FORESTRY
- N 7. CDOT/QUALITY ASSURANCE
- X 8. CTA TRAFFIC
- X 9. CTA FACILITIES
- N 10. 21ST CENTURY/RCN
- N 11. CHICAGO PARK DISTRICT
- X 12. COMED
- N 13. DEPARTMENT OF SEWERS
- X 14. DEPARTMENT OF WATER
- X 15. MCI WORLDCOM (ATS)
- X 16. METROPOLITAN WATER RECLAMATION DISTRICT
- X 17. PEOPLES ENERGY
- N 18. LOOKING GLASS NETWORK
- X 19. COMCAST

Distances are marked in feet and decimal parts thereof. Compare all points BEFORE building by same and at once report any differences BEFORE damage is done.

For easements, building lines and other restrictions not shown on survey plat refer to your abstract, deed, contract, title policy and local building line regulations.

NO dimensions shall be assumed by scale measurement upon this plat.

Monumentation or witness points were not set at the clients request.

Unless otherwise noted hereon the Bearing Basis, Elevation Datum and Coordinate Datum if used is ASSUMED.

COPYRIGHT GREMLEY & BIEDERMANN, INC. 2003 "All Rights Reserved"

REVISED: 01-05-2003 ADDITIONAL BOARD OF UNDERGROUND (G.L.)
REVISED: 11-18-2003 BOARD OF UNDERGROUND (G.L.)
REVISED: TOPOGRAPHY ADDED PER #1031825 10-02-03 (RS)
REVISED: SOUTH LINE APRIL 9, 2002 PER ORDER NO. 102607
REVISED: LEGAL January 16, 2001 (jrh)
REVISED: December 04, 2000 Board of Underground Added (jrh)

Checked / Drawn: LAE

ORDER NO. 1001531
SCALE: 1 inch = 40 Feet
DATE: OCTOBER 17, 2000
ADDRESS: ARCHER AVE. & PITNEY CT.
ORDERED BY: CONTINENTAL TITLE COMPANY

G:\sdsk8\proj\1001531\dwg\1001531.dwg

GRAPHIC SCALE
(IN FEET)
1 inch = 40 ft.

State of Illinois)
County of Cook)ss

We, GREMLEY & BIEDERMANN, INC. hereby certify that we have surveyed the above described property and that the plat hereon drawn is a correct representation of said survey corrected to a temperature of 62° Fahrenheit.

Field measurements completed on OCTOBER 2, 2003.

Signed on Jan. 19, 2004

By: _____

Professional Illinois Land Surveyor No. 2150?
My License Expires November 30, 2004
This professional service conforms to the current Illinois minimum standards for a boundary survey.

ARCHER AVENUE

S. FORK OF THE SOUTH BRANCH OF THE CHICAGO RIVER

PITNEY COURT

31st STREET

S. BENSON STREET

NOT INCLUDED

FLAT OF SURVEY

OF

NOTE THE ABOVE DESCRIPTION WAS TAKEN FROM INFORMATION SUPPLIED BY THE CLIENT
EASEMENTS AND RAILROAD RIGHT OF WAY HAVE NOT BEEN SHOWN HEREON

LOTS 51 TO 57 BOTH INCLUSIVE, LOTS 59 TO 67, BOTH INCLUSIVE, AND LOTS 68 TO 76, BOTH INCLUSIVE, (EXCEPT THE SOUTH 47 FEET OF SAID LOTS 68 TO 76) ALSO THE ALLEY OR STRIP OF LAND 16 FEET MORE OR LESS IN WIDTH LYING BETWEEN AND BOUNDED BY SAID LOTS 59 TO 67 ON THE NORTH AND BY SAID LOTS 68 TO 76 ON THE SOUTH, ALSO THAT PART OF PITNEY COURT LYING BETWEEN AND BOUNDED BY SAID LOTS 54 TO 57 ON THE WEST AND SAID LOT 59, SAID ALLEY OR STRIP OF LAND 16 FEET IN WIDTH, AND SAID LOT 76 ON THE EAST, AS LIES NORTH OF THE SOUTH LINE OF SAID LOT 57, EXTENDED EAST, AND SOUTH OF THE NORTH LINE OF SAID LOT 59, EXTENDED WEST, ALSO THAT PART OF PITNEY COURT AND 31ST STREET LYING EAST OF AND ADJOINING SAID LOTS 54 AND 55 NORTH OF THE NORTH LINE OF SAID LOT 59, EXTENDED WEST, AND SOUTHWESTERLY OF THE WESTERLY LINE OF PITNEY COURT AS ESTABLISHED NORTH OF 31ST STREET, EXTENDED SOUTHEASTERLY, ALL IN BROAD AND PITNEY'S SUBDIVISION OF BLOCK 30 AND OF LOT 2 IN BLOCK 29 IN CANAL TRUSTEES' SUBDIVISION OF THE SOUTH FRACTION OF SECTION 29 AND ALSO 4.84 ACRES IN THE NORTHEAST CORNER OF THE WEST HALF OF THE NORTHWEST QUARTER OF SECTION 32, ALL IN TOWNSHIP 39 NORTH, RANGE 14, EAST OF THE THIRD PRINCIPAL MERIDIAN, IN COOK COUNTY, ILLINOIS, TOGETHER WITH ALL OF THE RIGHT, TITLE AND INTEREST OF THE OWNER IN AND TO ANY AND ALL PROPERTY ADJACENT THERETO AND LYING WITHIN THE STREETS, ALLEYS AND WATERWAYS ADJOINING SAID PREMISES, EXCEPTING FROM THE FOREGOING A PART OF LOT 51 HERETOFORE CONVEYED BY MARBLEHEAD LIME COMPANY TO THE CITY OF CHICAGO BY DEED DATED JUNE 15, 1961 AND RECORDED APRIL 6, 1962 AS DOCUMENT NUMBER 18442196 AND DESCRIBED AS FOLLOWS THAT PART OF LOT 51 IN BROAD AND PITNEY'S SUBDIVISION OF THE SOUTH FRACTION OF SECTION 29 AND THE WEST HALF OF THE SOUTHWEST QUARTER OF SECTION 29, TOWNSHIP 39 NORTH, RANGE 14, EAST OF THE THIRD PRINCIPAL MERIDIAN, DESCRIBED AS FOLLOWS BEGINNING AT A POINT BEING 63.36 FEET WESTERLY OF THE WESTERLY STREET LINE OF PITNEY COURT AS MEASURED ALONG THE SOUTHERLY STREET LINE OF ARCHER AVENUE, THENCE WESTERLY ALONG A LINE FORMING AN ANGLE OF 2 DEGREES 30 MINUTES 23 SECONDS WITH THE SOUTHERLY STREET LINE OF ARCHER AVENUE, MEASURED FROM WESTERLY TO SOUTHWESTERLY A DISTANCE OF 132.23 FEET, THENCE SOUTHERLY AT RIGHT ANGLES TO THE LAST DESCRIBED LINE A DISTANCE OF 0.75 FEET; THENCE WESTERLY AT RIGHT ANGLES TO THE LAST DESCRIBED LINE A DISTANCE OF 38.98 FEET (MORE OR LESS) TO THE OF LOT 51, THENCE NORTHERLY ALONG THE WESTERLY LINE OF LOT 51 A DISTANCE OF 0.25 FEET (MORE OR LESS) TO THE SOUTHERLY STREET LINE OF ARCHER AVENUE, THENCE EASTERLY ALONG THE SOUTHERLY STREET LINE OF ARCHER AVENUE DISTANCE OF 169.98 FEET, MORE OR LESS, TO THE POINT OF BEGINNING, IN COOK COUNTY, ILLINOIS

LEGEND

⊕ TEST PIT

⊗ MONITORING WELL

+ SOIL BORING

–O UTILITY POLE

◎ MANHOLE

⊔ FIRE HYDRANT

BENCH MARK
TOP NUT ON FIRE HYDRANT
ELEVATION = 14.43 (CHICAGO CITY DATUM)

AVENUE

S. PITNEY

S. ARCHER

SOUTH FORK OF THE SOUTH BRANCH OF THE CHICAGO RIVER

COURT

PITNEY COURT VACATED

W. 31ST STREET

BENSEN STREET

CONCRETE BLOCK WALL

CONCRETE

9" TUNNEL OPENING

STEEL RETAINING WALL

ONE STORY BRICK BUILDING

2 STORY BRICK BUILDING

COMP COUNCIL HOLDS THAT CITY HAS NO RIGHT TO ALLEY AND THAT PART OF PITNEY COURT (NO DATE OR DOCUMENT NO PROVIDED)

SOUTH LINE OF SURVEY BY OCCUPATION (ACCORDING TO SURVEY BY CHICAGO GUARANTEE SURVEY COMPANY AS PLAT NO 2065974 DATED JULY 12 1960) AND AS SHOWN ON SURVEY BY GENLEY AND BIECKERMAN, INC AS ORDER NO 8925825 DATED OCTOBER 26 1989

NORTH LINE OF THE SOUTH 47 FEET OF LOTS 68 TO 76

VACATED BY INSTRUMENT RECORDED SEPTEMBER 7 1981 AS DOCUMENT NO 346489

Lot numbers: 51, 52, 53, 54, 55, 56, 57, 58
59, 60, 61, 62, 63, 64, 65, 66, 67
76, 75, 74, 73, 72, 71, 70, 69, 68

256.41   N89°27'56"E
554.17   N89°33'57"W
63.36
199.72
226.66
366.92

SCALE 1" = 40'
0 20 40 80
1"=40'

ORDERED BY LEVINE, FRICKE, RECON
SURVEY NO 214-00

For Building Restrictions and Easements refer to your Abstract Deed, Guarantee Policy and Local Ordinances
COMPARE ALL POINTS BEFORE BUILDING AND AT ONCE REPORT ANY DIFFERENCE

DRAWN RJM
214-00 DWG

FLAT OF SURVEY

OF

NOTE THE ABOVE DESCRIPTION WAS TAKEN FROM INFORMATION SUPPLIED BY THE CLIENT
EASEMENTS AND RAILROAD RIGHT OF WAY HAVE NOT BEEN SHOWN HEREON

LOTS 51 TO 57 BOTH INCLUSIVE, LOTS 59 TO 67, BOTH INCLUSIVE, AND LOTS 68 TO 76,
BOTH INCLUSIVE, (EXCEPT THE SOUTH 47 FEET OF SAID LOTS 68 TO 76) ALSO THE ALLEY
OR STRIP OF LAND 16 FEET MORE OR LESS IN WIDTH LYING BETWEEN AND BOUNDED BY
SAID LOTS 59 TO 67 ON THE NORTH AND BY SAID LOTS 68 TO 76 ON THE SOUTH, ALSO
THAT PART OF PITNEY COURT LYING BETWEEN AND BOUNDED BY SAID LOTS 54 TO 57 ON
THE WEST AND SAID LOT 59, SAID ALLEY OR STRIP OF LAND 16 FEET IN WIDTH, AND SAID
LOT 76 ON THE EAST, AS LIES NORTH OF THE SOUTH LINE OF SAID LOT 57, EXTENDED
EAST, AND SOUTH OF THE NORTH LINE OF SAID LOT 59, EXTENDED WEST, ALSO THAT
PART OF PITNEY COURT AND 31ST STREET LYING EAST OF AND ADJOINING SAID LOTS 54
AND 55 NORTH OF THE NORTH LINE OF SAID LOT 59, EXTENDED WEST, AND
SOUTHWESTERLY OF THE WESTERLY LINE OF PITNEY COURT AS ESTABLISHED NORTH OF
31ST STREET, EXTENDED SOUTHEASTERLY, ALL IN BROAD AND PITNEY'S SUBDIVISION OF
BLOCK 30 AND OF LOT 2 IN BLOCK 29 IN CANAL TRUSTEES' SUBDIVISION OF THE SOUTH
FRACTION OF SECTION 29 AND ALSO 4.84 ACRES IN THE NORTHEAST CORNER OF THE
WEST HALF OF THE NORTHWEST QUARTER OF SECTION 32, ALL IN TOWNSHIP 39 NORTH,
RANGE 14, EAST OF THE THIRD PRINCIPAL MERIDIAN, IN COOK COUNTY, ILLINOIS,
TOGETHER WITH ALL OF THE RIGHT, TITLE AND INTEREST OF THE OWNER IN AND TO
ANY AND ALL PROPERTY ADJACENT THERETO AND LYING WITHIN THE STREETS, ALLEYS
AND WATERWAYS ADJOINING SAID PREMISES, EXCEPTING FROM THE FOREGOING A
PART OF LOT 51 HERETOFORE CONVEYED BY MARBLEHEAD LIME COMPANY TO THE CITY
OF CHICAGO BY DEED DATED JUNE 15, 1961 AND RECORDED APRIL 6, 1962 AS DOCUMENT
NUMBER 18442196 AND DESCRIBED AS FOLLOWS THAT PART OF LOT 51 IN BROAD AND
PITNEY'S SUBDIVISION OF BLOCK 30 AND LOT 2 IN BLOCK 29 IN CANAL TRUSTEES'
SUBDIVISION OF THE SOUTH FRACTION OF SECTION 29 AND THE WEST HALF OF THE
SOUTHWEST QUARTER OF SECTION 29, TOWNSHIP 39 NORTH, RANGE 14, EAST OF THE
THIRD PRINCIPAL MERIDIAN, DESCRIBED AS FOLLOWS BEGINNING AT A POINT BEING
63.36 FEET WESTERLY OF THE WESTERLY STREET LINE OF PITNEY COURT AS MEASURED
ALONG THE SOUTHERLY STREET LINE OF ARCHER AVENUE, THENCE WESTERLY ALONG
A LINE FORMING AN ANGLE OF 2 DEGREES 30 MINUTES 23 SECONDS WITH THE
SOUTHERLY STREET LINE OF ARCHER AVENUE, MEASURED FROM WESTERLY TO
SOUTHWESTERLY A DISTANCE OF 132.23 FEET, THENCE SOUTHERLY AT RIGHT ANGLES
TO THE LAST DESCRIBED LINE A DISTANCE OF 0.75 FEET; THENCE WESTERLY AT RIGHT
ANGLES TO THE LAST DESCRIBED LINE A DISTANCE OF 38.98 FEET (MORE OR LESS) TO
THE OF LOT 51, THENCE NORTHERLY ALONG THE WESTERLY LINE OF LOT 51 A DISTANCE
OF 0.25 FEET (MORE OR LESS) TO THE SOUTHERLY STREET LINE OF ARCHER AVENUE,
THENCE EASTERLY ALONG THE SOUTHERLY STREET LINE OF ARCHER AVENUE
DISTANCE OF 169.98 FEET, MORE OR LESS, TO THE POINT OF BEGINNING, IN COOK
COUNTY, ILLINOIS

LEGEND

- ⊕ TEST PIT
- ⊗ MONITORING WELL
- ╋ SOIL BORING
- ─○ UTILITY POLE
- ◎ MANHOLE
- ⊔ FIRE HYDRANT

W. 31ST STREET

PITNEY COURT

S. PITNEY

S. ARCHER AVENUE

SOUTH FORK OF THE SOUTH BRANCH OF THE CHICAGO RIVER

BENSEN STREET

ONE STORY BRICK BUILDING

2 STORY BRICK BUILDING

BENCH MARK
TOP NUT ON FIRE HYDRANT
ELEVATION = 14.43 (CHICAGO CITY DATUM)

SOUTH LINE OF SURVEY BY OCCUPATION (ACCORDING TO
SURVEY BY CHICAGO GUARANTEE SURVEY COMPANY AS PLAT
NO. 2065974 DATED JULY 12 1960) AND AS SHOWN ON
SURVEY BY GENLEY AND BIECKERMAN, INC AS ORDER
NO 8925825 DATED OCTOBER 26 1989

NORTH LINE OF THE SOUTH 47 FEET
OF LOTS 68 TO 76

VACATED BY INSTRUMENT RECORDED SEPTEMBER 7 1981 AS DOCUMENT NO 346489

SCALE 1" = 40'

0   20   40   80

ORDERED BY LEVINE, FRICKE, RECON
SURVEY NO. 214-00

For Building Restrictions and Easements refer to your
Abstract Deed, Guarantee Policy and Local Ordinances
COMPARE ALL POINTS BEFORE BUILDING
AND AT ONCE REPORT ANY DIFFERENCE

DRAWN RJM
214-00 DWG

GRAPHIC SCALE

(IN FEET)
1 inch = 40 ft.

GREMLEY & BIEDERMANN, INC.

PROFESSIONAL ILLINOIS LAND SURVEYORS

4505 N. Elston Avenue   Chicago, Illinois 60630
Telephone: (773) 685-5102   Fax: (773) 286-4184
Illinois Land Surveyor Corporation No. 16
License No. 184-002761

Plat of Survey

Lots 51 to 57, both inclusive, Lots 59 to 67, both inclusive, and Lots 68 to 76, both inclusive, (except the South 47 feet of said Lots 68 to 76); also the alley or strip of land 16 feet, more or less, in width, lying between and bounded by said Lots 59 to 67 on the North and by said Lots 68 to 76 on the South; also that part of Pitney Court lying between and bounded by said Lots 54 to 57on the West and said Lot 59, said alley or strip of land 16 feet in width, and said Lot 76 on the East, as lies North of the South line of said Lot 57, extended East, and South of the North line of said Lot 59, extended West; also that part of Pitney Court and 31st Street, lying East of and adjoining said Lots 54 and 55, North of the North line of said Lot 59, extended West and Southwesterly of the Westerly line of Pitney Court as established, North of 31st Street, extended Southeasterly, all in Broad and Pitney's subdivision of Block 30 and of Lot 2 in Block 29 in Canal Trustees' Subdivision of the South Fraction of Section 29 and also of 4.84 acres in the Northeast corner of the West Half of the Northwest Quarter of Section 32, all in Township 39 North, Range 14, East of the Third Principal Meridian, together with all of the right, title and interest of the owner in and to any and all property adjacent thereto and lying within the streets, alleys and waterways adjoining said premises. Excepting from the foregoing, a part of Lot 51 heretofore conveyed by Marblehead Lime Company to the city of Chicago, by deed dated June 15, 1961 recorded April 6, 1962 as document 18442196 and described as follows: That part of Lot 51 in Broad and Pitney's Subdivision of Block 30 and of Lot 2 in Block 29 in Canal Trustees' Subdivision of the South Fraction of Section 29, Township 39 North, Range 14, East of the Third Principal Meridian, described as follows: beginning at a point in the Southerly street line of Archer Avenue, said point being 63.36 feet Westerly of the Westerly street line of Pitney Court, as measured along the Southerly street line of Archer Avenue; Thence Westerly along the Southerly street line of Archer Avenue, measured from Westerly to Southwesterly, a distance of 132.23 feet; Thence Southerly at right angles to the last described line, a distance of 0.75 feet; Thence Westerly at right angles to the last described line, a distance of 38.58 feet (more or less) to the Westerly line of Lot 51; Thence Northerly along the Westerly line of Lot 51, a distance of 8.25 feet (more or less) to the Southerly street line of Archer Avenue; Thence Easterly along the Southerly street line of Archer Avenue, a distance of 169.88 feet, more or less, to the point of beginning, in Cook County, Illinois.

Further being described as: beginning at the intersection of the South line of West 31st Street with the West line of Benson Street; Thence South 00° 00' 00" East along the West line of Benson Street 199.85 feet; Thence North 89° 19' 20" West 555.79 feet to the East line of the South Branch of the Chicago River as occupied; Thence North 07° 32' 36" West along said East line 224.69 feet to a bend in said East line; Thence continuing North 27° 13' 38" West along said East line 354.34 feet to the Southerly line of Archer Avenue as widened; Thence North 53° 16' 25" East along the last described line 43.48 feet; Thence North 36° 43' 35" West 0.75 feet; Thence North 53° 16' 25" East along the Southerly line of Archer Avenue as widened 132.23 feet; Thence North 55° 46' 48" East along the Southerly line of Archer Avenue 63.36 feet to the Southwesterly line of Pitney Court; Thence South 31° 27' 03" East along said Southwesterly line and its Southeasterly extension 569.43 feet to the Westerly extension of the South line of West 31st Street; Thence South 89° 59' 00" East along said extension and the South line for a distance of 257.48 feet to the point of beginning, in Cook County, Illinois.

LEGEND

Symbol	Description	Symbol	Description	Symbol	Description
	Storm MH		Water Meter		Electric Pedestal
	Storm CB		Water Fire Hydrant		Electric Light Pole
	Storm Inlet		Telephone Pole		Electric Traffic Signal
	San MH		Telephone MH		Electric Light Pole with Traffic Signal
	San Clean Out		Telephone Vault		Electric Traffic Control Box
	Water Valve Vault		Telephone Pedestal		Gas Valve
	Water MH		Electric Utility Pole		Gas MH
	Water Buffalo Box		Electric MH		Gas Vault
	Water Hand Hole		Electric Vault		Gas Buffalo Box
			Electric Meter		Cable TV/Pedestal
			Electric Pad		

Tree — Deciduous
Tree — Evergreen
Parking Meter
Sign Post
Mail Box
Bumper Post
Guy Anchor
Soil Boring
Monumentation Found
Monumentation Established
Unclassified Manhole

A.=ASPHALT ELEVATION
FFE.=FINISHED FLOOR ELEVATION
W.=WALK ELEVATION
X.=CONCRETE ELEVATION
C.=CURB ELEVATION
G.=GUTTER ELEVATION
EL.=ELEVATION

SITE BENCHMARK
CROSS FOUND 5.00' NORTH
& 5.00' EAST EL.=12.49'

BENCHMARK # 4642
ELEVATION = 16.243

LOCATION: S. ASHLAND & S. ARCHER

ABOUT 78' WESTERLY OF THE WEST LINE OF S. ASHLAND.
ABOUT ON SOUTHERLY LINE OF S. ARCHER.
MARK CUT AT NORTHWESTERLY CORNER OF STONE WINDOW SILL ON
NORTHERLY SIDE OF 1 STORY BUILDING, 9.5' WESTERLY OF NORTHEASTERLY
CORNER OF BUILDING & 3.1' ABOVE WALK.

UTILITY WARNING

The underground utilities shown have been located from field survey information and existing drawings. The surveyor makes NO guarantee that the underground utilities shown comprise all such utilities in the area, either in service or abandoned. The surveyor further does not warrant that the underground utilities shown are in the exact location indicated although he does certify that they are located as accurately as possible from information available. The surveyor has not physically located the underground utilities.

Call DIGGER — (312) 744-7000 within the City of Chicago.

Outside of the City of Chicago call J.U.L.I.E. (800) 892-0123 prior to construction or excavation.

THE CITY OF CHICAGO BOARD OF UNDERGROUND INVOLVEMENT HAS BEEN REQUESTED FOR YOUR SURVEY. THE RESULTS TO DATE ARE INDICATED BELOW. AS A CONVENIENCE TO YOU THE UTILITY DATA IS REVIEWED AND ADDED TO THIS PLAT AS IT IS RECEIVED. THESE RECORDS ARE THEN FORWARDED TO YOU. PLEASE BE AWARE THAT NO OTHER COPY OF THIS INFORMATION IS RETAINED.

X - INVOLVED.   N - NOT INVOLVED.   BLANK - NOT RECEIVED.

X 1. SBC (AMERITECH)
2. AT&T BROADBAND
X 3. BUREAU OF ELECTRICITY
X 4. BUREAU OF STREETS
X 5. BUREAU OF TRAFFIC
N 6. BUREAU OF FORESTRY
X 7. DOT/QUALITY ASSURANCE
X 8. CTA TRAFFIC
X 9. CTA FACILITIES
N 10. 21ST CENTURY/RCN
N 11. CHICAGO PARK DISTRICT
X 12. COMED
X 13. DEPARTMENT OF SEWERS
X 14. DEPARTMENT OF WATER
X 15. MCI WORLDCOM (ATS)
X 16. METROPOLITAN WATER RECLAMATION DISTRICT
X 17. PEOPLES ENERGY
X 18. LOOKING GLASS NETWORK
X 19. COMCAST

Distances are marked in feet and decimal parts thereof. Compare all points BEFORE building by same and at once report any differences BEFORE damage is done.

For easements, building lines and other restrictions not shown on survey plat refer to your abstract, deed, contract, title policy and local building line regulations.

NO dimensions shall be assumed by scale measurement upon this plat.

Monumentation or witness points were not set at the clients request.

Unless otherwise noted hereon the Bearing Basis, Elevation Datum and Coordinate Datum if used is ASSUMED.

REVISED: 01-05-2003 ADDITIONAL BOARD OF UNDERGROUND (G.L.)
REVISED: 11-18-2003 BOARD OF UNDERGROUND (G.L.)
REVISED: TOPOGRAPHY ADDED PER #1031825 10-02-03 (RS)
REVISED: SOUTH LINE APRIL 9, 2002 PER ORDER NO. 102607
REVISED: LEGAL January 16, 2001 (jrh)
REVISED: December 04, 2000 Board of Underground Added (jrh)

Checked / Drawn   LAE

ORDER NO. **1001531**
SCALE: 1 inch = 40 Feet
DATE: OCTOBER 17, 2000
ADDRESS: ARCHER AVE. & PITNEY CT.
ORDERED BY: CONTINENTAL TITLE COMPANY

G:\sdsk8\proj\1001531\dwg\1001531.dwg

COPYRIGHT GREMLEY & BIEDERMANN, INC. 2003 "All Rights Reserved"
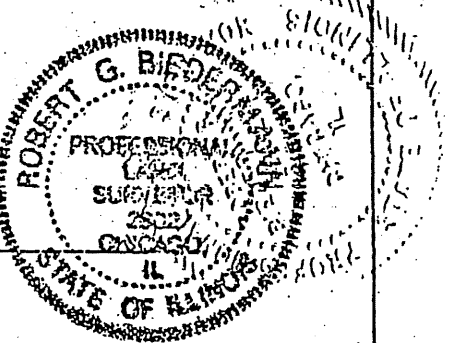
State of Illinois)
County of Cook)ss

We, GREMLEY & BIEDERMANN, INC. hereby certify that we have surveyed the above described property and that the plat hereon drawn is a correct representation of said survey corrected to a temperature of 62° Fahrenheit.
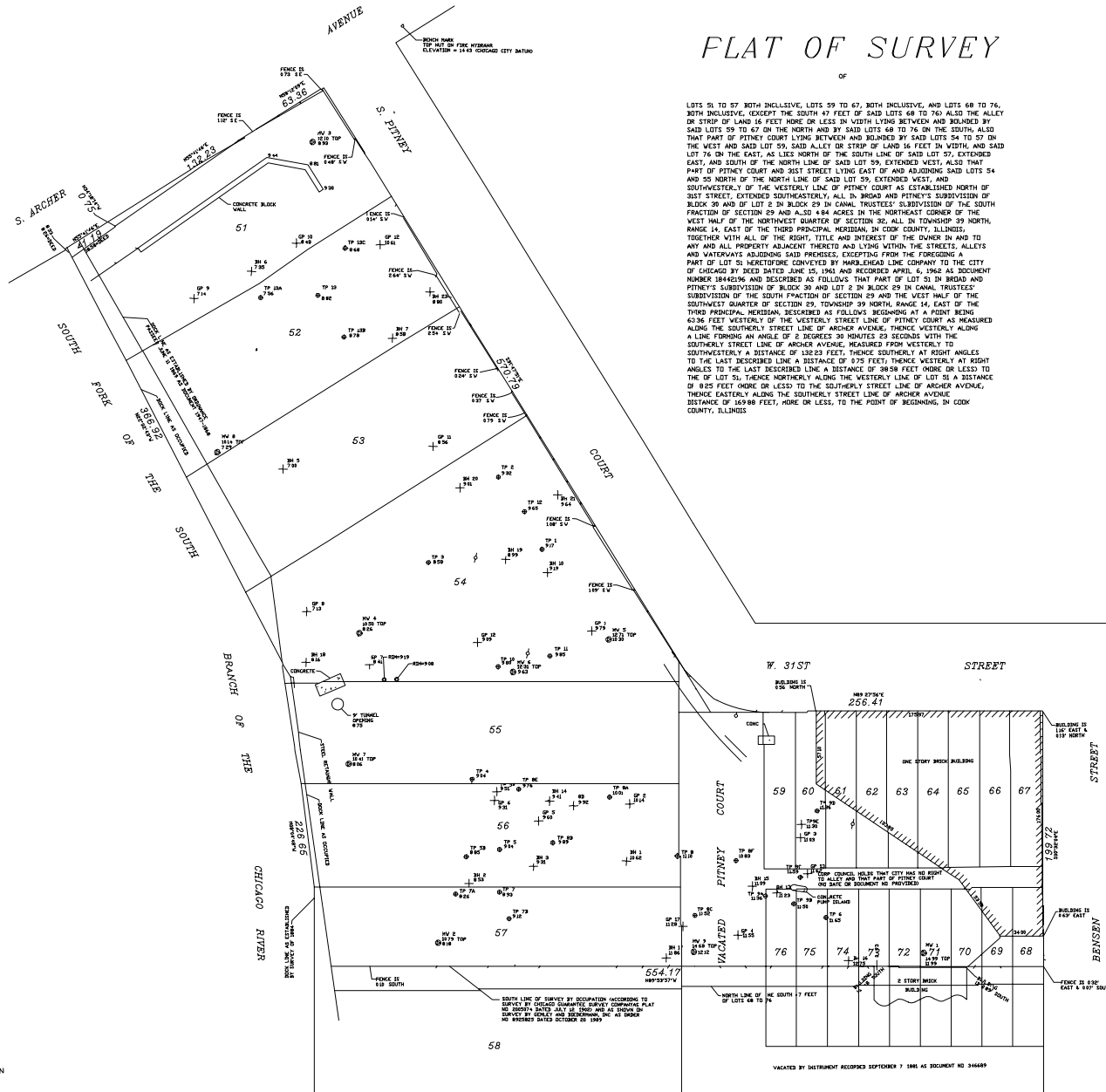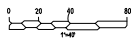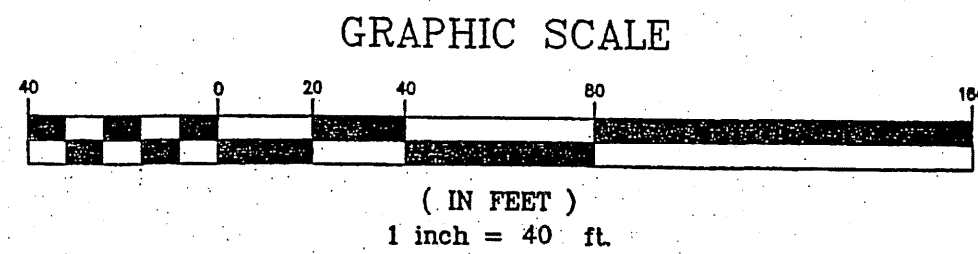
Field measurements completed on OCTOBER 2, 2003.

Signed on Jan. 19, 2004

By:

Professional Illinois Land Surveyor No. 2302
My License Expires November 30, 2004
This professional service conforms to the current Illinois minimum standards for a boundary survey.
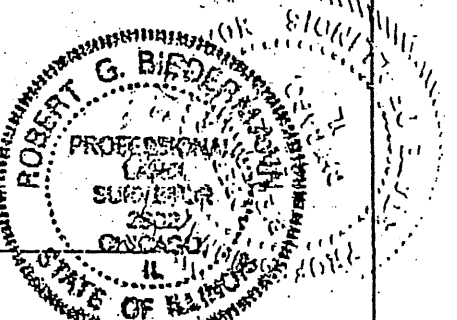
Data File	I:\Peoples Gas\Pitney Court--27112\Reports\F	Variable:	ars0-7		
Raw Statistics			Normal Distribution Test		
Number of Valid Samples		75	Lilliefors Test Statisitic		0.152705
Number of Unique Samples		54	Lilliefors 5% Critical Value		0.102306
Minimum		0.2	Data not normal at 5% significance level		
Maximum		22.5			
Mean		5.498	95% UCL (Assuming Normal Distribution)		
Median		4.22	Student's-t UCL		6.444458
Standard Deviation		4.920776			
Variance		24.21404	Gamma Distribution Test		
Coefficient of Variation		0.895012	A-D Test Statistic		1.360218
Skewness		1.351319	A-D 5% Critical Value		0.782321
			K-S Test Statistic		0.121855
Gamma Statistics			K-S 5% Critical Value		0.106217
k hat		0.976244	Data do not follow gamma distribution		
k star (bias corrected)		0.946083	at 5% significance level		
Theta hat		5.631791			
Theta star		5.811331	95% UCLs (Assuming Gamma Distribution)		
nu hat		146.4365	Approximate Gamma UCL		6.76237
nu star		141.9124	Adjusted Gamma UCL		6.789827
Approx.Chi Square Value (.05)		115.3788			
Adjusted Level of Significance		0.0468	Lognormal Distribution Test		
Adjusted Chi Square Value		114.9123	Lilliefors Test Statisitic		0.190836
			Lilliefors 5% Critical Value		0.102306
Log-transformed Statistics			Data not lognormal at 5% significance level		
Minimum of log data		-1.609438			
Maximum of log data		3.113515	95% UCLs (Assuming Lognormal Distribution)		
Mean of log data		1.111441	95% H-UCL		11.60177
Standard Deviation of log data		1.360627	95% Chebyshev (MVUE) UCL		14.24759
Variance of log data		1.851307	97.5% Chebyshev (MVUE) UCL		17.16986
			99% Chebyshev (MVUE) UCL		22.91011
			95% Non-parametric UCLs		
			CLT UCL		6.43261
			Adj-CLT UCL (Adjusted for skewness)		6.527345
			Mod-t UCL (Adjusted for skewness)		6.459235
			Jackknife UCL		6.444458
			Standard Bootstrap UCL		6.421239
			Bootstrap-t UCL		6.605588
RECOMMENDATION			Hall's Bootstrap UCL		6.581481
Data are Non-parametric (0.05)			Percentile Bootstrap UCL		6.463733
			BCA Bootstrap UCL		6.54
Use 97.5% Chebyshev (Mean, Sd) UCL			95% Chebyshev (Mean, Sd) UCL		7.974736
			97.5% Chebyshev (Mean, Sd) UCL		**9.046422**
			99% Chebyshev (Mean, Sd) UCL		11.15154

Data File	I:\Peoples Gas\Pitney Court--27112\Reports\F	Variable:	ars0-10		
Raw Statistics			Normal Distribution Test		
Number of Valid Samples		91	Lilliefors Test Statisitic		0.165422
Number of Unique Samples		59	Lilliefors 5% Critical Value		0.092878
Minimum		0.2	Data not normal at 5% significance level		
Maximum		22.5			
Mean		4.851868	95% UCL (Assuming Normal Distribution)		
Median		3.7	Student's-t UCL		5.685312
Standard Deviation		4.783838			
Variance		22.8851	Gamma Distribution Test		
Coefficient of Variation		0.985978	A-D Test Statistic		2.258746
Skewness		1.46895	A-D 5% Critical Value		0.791047
			K-S Test Statistic		0.152827
Gamma Statistics			K-S 5% Critical Value		0.097198
k hat		0.811268	Data do not follow gamma distribution		
k star (bias corrected)		0.791849	at 5% significance level		
Theta hat		5.980599			
Theta star		6.127266	95% UCLs (Assuming Gamma Distribution)		
nu hat		147.6508	Approximate Gamma UCL		5.957613
nu star		144.1165	Adjusted Gamma UCL		5.977283
Approx.Chi Square Value (.05)		117.3682			
Adjusted Level of Significance		0.047363	Lognormal Distribution Test		
Adjusted Chi Square Value		116.9819	Lilliefors Test Statisitic		0.187858
			Lilliefors 5% Critical Value		0.092878
Log-transformed Statistics			Data not lognormal at 5% significance level		
Minimum of log data		-1.609438			
Maximum of log data		3.113515	95% UCLs (Assuming Lognormal Distribution)		
Mean of log data	2.337647	0.849145	95% H-UCL		10.87896
Standard Deviation of log data		1.489882	95% Chebyshev (MVUE) UCL		13.39934
Variance of log data		2.219749	97.5% Chebyshev (MVUE) UCL		16.20386
			99% Chebyshev (MVUE) UCL		21.71277
				95% Non-parametric UCLs	
				CLT UCL	5.676733
				Adj-CLT UCL (Adjusted for skewness)	5.759246
				Mod-t UCL (Adjusted for skewness)	5.698183
				Jackknife UCL	5.685312
				Standard Bootstrap UCL	5.675486
				Bootstrap-t UCL	5.726764
RECOMMENDATION			Hall's Bootstrap UCL		5.74607
Data are Non-parametric (0.05)			Percentile Bootstrap UCL		5.726703
			BCA Bootstrap UCL		5.734286
Use 97.5% Chebyshev (Mean, Sd) UCL			95% Chebyshev (Mean, Sd) UCL		7.037779
			97.5% Chebyshev (Mean, Sd) UCL		**7.983625**
			99% Chebyshev (Mean, Sd) UCL		9.841555

Data File	I:\Peoples Gas\Pitney Court--27112\Reports\F	Variable:	ars7'-10		
Raw Statistics			Normal Distribution Test		
Number of Valid Samples		16	Shapiro-Wilk Test Statisitic		0.72922
Number of Unique Samples		8	Shapiro-Wilk 5% Critical Value		0.887
Minimum		0.2	Data not normal at 5% significance level		
Maximum		8.6			
Mean		1.823125	95% UCL (Assuming Normal Distribution)		
Median		0.2	Student's-t UCL		2.895071
Standard Deviation		2.445899			
Variance		5.982423	Gamma Distribution Test		
Coefficient of Variation		1.341597	A-D Test Statistic		1.736915
Skewness		1.691158	A-D 5% Critical Value		0.785343
			K-S Test Statistic		0.35936
Gamma Statistics			K-S 5% Critical Value		0.225194
k hat		0.625993	Data do not follow gamma distribution		
k star (bias corrected)		0.550286	at 5% significance level		
Theta hat		2.912374			
Theta star		3.313051	95% UCLs (Assuming Gamma Distribution)		
nu hat		20.03177	Approximate Gamma UCL		3.524912
nu star		17.60915	Adjusted Gamma UCL		3.813604
Approx.Chi Square Value (.05)		9.107654			
Adjusted Level of Significance		0.03348	Lognormal Distribution Test		
Adjusted Chi Square Value		8.418198	Shapiro-Wilk Test Statisitic		0.748038
			Shapiro-Wilk 5% Critical Value		0.887
Log-transformed Statistics			Data not lognormal at 5% significance level		
Minimum of log data		-1.609438			
Maximum of log data		2.151762	95% UCLs (Assuming Lognormal Distribution)		
Mean of log data		-0.380368	95% H-UCL		8.183904
Standard Deviation of log data		1.492952	95% Chebyshev (MVUE) UCL		5.283784
Variance of log data		2.228906	97.5% Chebyshev (MVUE) UCL		6.775196
			99% Chebyshev (MVUE) UCL		9.704784
				95% Non-parametric UCLs	
				CLT UCL	2.828912
				Adj-CLT UCL (Adjusted for skewness)	3.105149
				Mod-t UCL (Adjusted for skewness)	2.938158
				Jackknife UCL	2.895071
				Standard Bootstrap UCL	2.813403
				Bootstrap-t UCL	3.4439
RECOMMENDATION				Hall's Bootstrap UCL	3.348249
Data are Non-parametric (0.05)				Percentile Bootstrap UCL	2.886875
				BCA Bootstrap UCL	3.12875
Use 99% Chebyshev (Mean, Sd) UCL				95% Chebyshev (Mean, Sd) UCL	4.488482
				97.5% Chebyshev (Mean, Sd) UCL	5.641784
				99% Chebyshev (Mean, Sd) UCL	**7.907222**

Data File	I:\Peoples Gas\Pitney Court--27112\Reports\F	Variable:	AllDepths		
Raw Statistics			Normal Distribution Test		
Number of Valid Samples		64	Lilliefors Test Statisitic		0.251195
Number of Unique Samples		39	Lilliefors 5% Critical Value		0.11075
Minimum		0.2	Data not normal at 5% significance level		
Maximum		22.5			
Mean		2.373844	95% UCL (Assuming Normal Distribution)		
Median		1.69	Student's-t UCL		3.050159
Standard Deviation		3.240993			
Variance		10.50403	Gamma Distribution Test		
Coefficient of Variation		1.365293	A-D Test Statistic		3.293806
Skewness		4.009293	A-D 5% Critical Value		0.794589
			K-S Test Statistic		0.234669
Gamma Statistics			K-S 5% Critical Value		0.116007
k hat		0.72588	Data do not follow gamma distribution		
k star (bias corrected)		0.702271	at 5% significance level		
Theta hat		3.270298			
Theta star		3.380239	95% UCLs (Assuming Gamma Distribution)		
nu hat		92.91263	Approximate Gamma UCL		3.091385
nu star		89.89068	Adjusted Gamma UCL		3.110326
Approx.Chi Square Value (.05)		69.02615			
Adjusted Level of Significance		0.04625	Lognormal Distribution Test		
Adjusted Chi Square Value		68.6058	Lilliefors Test Statisitic		0.251643
			Lilliefors 5% Critical Value		0.11075
Log-transformed Statistics			Data not lognormal at 5% significance level		
Minimum of log data		-1.609438			
Maximum of log data		3.113515	95% UCLs (Assuming Lognormal Distribution)		
Mean of log data		0.03612	95% H-UCL		4.628284
Standard Deviation of log data		1.420583	95% Chebyshev (MVUE) UCL		5.588641
Variance of log data		2.018056	97.5% Chebyshev (MVUE) UCL		6.813142
			99% Chebyshev (MVUE) UCL		9.218438
			95% Non-parametric UCLs		
			CLT UCL		3.040214
			Adj-CLT UCL (Adjusted for skewness)		3.257157
			Mod-t UCL (Adjusted for skewness)		3.083997
			Jackknife UCL		3.050159
			Standard Bootstrap UCL		3.011352
			Bootstrap-t UCL		3.424273
RECOMMENDATION			Hall's Bootstrap UCL		6.17523
Data are Non-parametric (0.05)			Percentile Bootstrap UCL		3.055297
			BCA Bootstrap UCL		3.340938
Use 97.5% Chebyshev (Mean, Sd) UCL			95% Chebyshev (Mean, Sd) UCL		4.139739
			97.5% Chebyshev (Mean, Sd) UCL		**4.903843**
			99% Chebyshev (Mean, Sd) UCL		6.404778

Data File	I:\Peoples Gas\Pitney Court--27112\Reports\F	Variable:	ars>10		
Raw Statistics			**Normal Distribution Test**		
Number of Valid Samples	29		Shapiro-Wilk Test Statisitic		0.863471
Number of Unique Samples	24		Shapiro-Wilk 5% Critical Value		0.926
Minimum	0.2		Data not normal at 5% significance level		
Maximum	11				
Mean	3.277793		**95% UCL (Assuming Normal Distribution)**		
Median	2.58		Student's-t UCL		4.194688
Standard Deviation	2.902556				
Variance	8.424834		**Gamma Distribution Test**		
Coefficient of Variation	0.885522		A-D Test Statistic		0.568173
Skewness	1.319396		A-D 5% Critical Value		0.772202
			K-S Test Statistic		0.148652
Gamma Statistics			K-S 5% Critical Value		0.167135
k hat	1.085346		Data follow gamma distribution		
k star (bias corrected)	0.996057		at 5% significance level		
Theta hat	3.020045				
Theta star	3.290768		**95% UCLs (Assuming Gamma Distribution)**		
nu hat	62.95006		**Approximate Gamma UCL**		**4.585565**
nu star	57.77131		Adjusted Gamma UCL		4.679934
Approx.Chi Square Value (.05)	41.29533				
Adjusted Level of Significance	0.0407		**Lognormal Distribution Test**		
Adjusted Chi Square Value	40.46262		Shapiro-Wilk Test Statisitic		0.887972
			Shapiro-Wilk 5% Critical Value		0.926
Log-transformed Statistics			Data not lognormal at 5% significance level		
Minimum of log data	-1.609438				
Maximum of log data	2.397895		**95% UCLs (Assuming Lognormal Distribution)**		
Mean of log data	0.660311		95% H-UCL		7.770919
Standard Deviation of log data	1.227654		95% Chebyshev (MVUE) UCL		8.634395
Variance of log data	1.507134		97.5% Chebyshev (MVUE) UCL		10.66557
			99% Chebyshev (MVUE) UCL		14.65541
			95% Non-parametric UCLs		
			CLT UCL		4.164355
			Adj-CLT UCL (Adjusted for skewness)		4.305458
			Mod-t UCL (Adjusted for skewness)		4.216697
			Jackknife UCL		4.194688
			Standard Bootstrap UCL		4.124706
			Bootstrap-t UCL		4.371891
RECOMMENDATION			Hall's Bootstrap UCL		4.426065
Data follow gamma distribution (0.05)			Percentile Bootstrap UCL		4.158586
			BCA Bootstrap UCL		4.294414
Use Approximate Gamma UCL			95% Chebyshev (Mean, Sd) UCL		5.627201
			97.5% Chebyshev (Mean, Sd) UCL		6.643792
			99% Chebyshev (Mean, Sd) UCL		8.640688

TACO SSL Model: Surface Soil Cleanup Objectives for Contaminants Based Upon the Migration to Groundwater Exposure Route

Compound/Analyte: Benzene

Equation S17

$$\mathrm{Re}\, mediationObjective = C_w * \left[K_d + \frac{\theta_w + \theta_a * H^{'}}{\rho_b} \right]$$ = 1.19

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
C_w	See equation S18 below	mg/L	0.5
K_d	See equation S19 below	L/kg	2.23820
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.15
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.28
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.5
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.228

Equation S18

$$C_w = DF * GW_{obj}$$ = 0.5

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
DF	Default Value of 20 or Equation S22	unitless	20
GW_{obj}	TACO Appendix B Table E or Equation S23	mg/L	0.025

Equation S19

$$K_d = K_{oc} * f_{oc}$$ = 2.23820

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
K_{oc}	Chemical Specific TACO Appendix C Table E	cm^3/g	58.9
f_{oc} (Organic Carbon Content)	Field measurement or TACO Appendix C Table B	g/g	0.038

The calculated Remediation Objective must now be compared to the C_{sat} value, the most restrict value will be the Tier 2 screening level.

Equation S29

$$C_{sat} = \frac{S}{\rho_b} * \left[(K_d * \rho_b) + \theta_w + (H'*\theta_a) \right]$$

= 4166.3	(Calculated Value)
870	(TACO Value)

Where

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
S	Chemical Specific TACO Appendix C Table E	mg/L	1,750
K_d	See equation S19 above	L/kg	2.23820
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.15
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.28
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.5
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.228

Results:

Chemical Name	Remediation Objective	C_{sat}	Tier 2 Screening Level
Benzene	1.19	870.0	1.19

TACO SSL Model: Surface Soil Cleanup Objectives for Contaminants Based Upon the Migration to Groundwater Exposure Route

Compound/Analyte: Benzene

Equation S17

$$\text{Re}\,mediationObjective = C_w * \left[K_d + \frac{\theta_w + \theta_a * H^{'}}{\rho_b} \right] = 1.17$$

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
C_w	See equation S18 below	mg/L	0.5
K_d	See equation S19 below	L/kg	2.23820
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.2
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.05
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	2
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.228

Equation S18

$$C_w = DF * GW_{obj} = 0.5$$
Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
DF	Default Value of 20 or Equation S22	unitless	20
GW_{obj}	TACO Appendix B Table E or Equation S23	mg/L	0.025

Equation S19

$$K_d = K_{oc} * f_{oc} = 2.23820$$
Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
K_{oc}	Chemical Specific TACO Appendix C Table E	cm^3/g	58.9
f_{oc} (Organic Carbon Content)	Field measurement or TACO Appendix C Table B	g/g	0.038

The calculated Remediation Objective must now be compared to the C_{sat} value, the most restrict value will be the Tier 2 screening level.

Equation S29

$$C_{sat} = \frac{S}{\rho_b} * \left[\left(K_d * \rho_b \right) + \theta_w + \left(H' * \theta_a \right) \right]$$

= 4101.8   (Calculated Value)

870   (TACO Value)

Where

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
S	Chemical Specific TACO Appendix C Table E	mg/L	1,750
K_d	See equation S19 above	L/kg	2.23820
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.2
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.05
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	2
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.228

Results:

Chemical Name	Remediation Objective	C_{sat}	Tier 2 Screening Level
Benzene	1.17	870.0	1.17

TACO SSL Model: Subsurface Soil Cleanup Objectives for Contaminants Based Upon the Migration to Groundwater Exposure Route

Compound/Analyte: Benzene

Equation S17

$$\text{Re}\,mediationObjective = C_w * \left[K_d + \frac{\theta_w + \theta_a * H^{'}}{\rho_b} \right]$$ = 0.235

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
C_w	See equation S18 below	mg/L	0.5
K_d	See equation S19 below	L/kg	0.33573
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.16
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.24
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.6
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.228

Equation S18

$$C_w = DF * GW_{obj}$$ = 0.5

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
DF	Default Value of 20 or Equation S22	unitless	20
GW_{obj}	TACO Appendix B Table E or Equation S23	mg/L	0.025

Equation S19

$$K_d = K_{oc} * f_{oc}$$ = 0.33573

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
K_{oc}	Chemical Specific TACO Appendix C Table E	cm^3/g	58.9
f_{oc} (Organic Carbon Content)	Field measurement or TACO Appendix C Table B	g/g	0.0057

The calculated Remediation Objective must now be compared to the C_{sat} value, the most restrict value will be the Tier 2 screening level.

Equation S29

$$C_{sat} = \frac{S}{\rho_b} * \left[(K_d * \rho_b) + \theta_w + (H' * \theta_a) \right]$$

= 822.4   (Calculated Value)

870   (TACO Value)

Where

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
S	Chemical Specific TACO Appendix C Table E	mg/L	1,750
K_d	See equation S19 above	L/kg	0.33573
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.16
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.24
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.6
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.228

Results:

Chemical Name	Remediation Objective	C_{sat}	Tier 2 Screening Level
Benzene	0.235	822.4	0.235

TACO SSL Model: Subsurface Soil Cleanup Objectives for Contaminants Based Upon the Migration to Groundwater Exposure Route

Compound/Analyte: Benzene

Equation S17

$$\mathrm{Re}\,mediation\,Objective = C_w * \left[K_d + \frac{\theta_w + \theta_a * H'}{\rho_b} \right] \quad = 0.231$$

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
C_w	See equation S18 below	mg/L	0.5
K_d	See equation S19 below	L/kg	0.33573
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.17
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.19
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.7
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.228

Equation S18

$$C_w = DF * GW_{obj} \quad = 0.5$$

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
DF	Default Value of 20 or Equation S22	unitless	20
GW_{obj}	TACO Appendix B Table E or Equation S23	mg/L	0.025

Equation S19

$$K_d = K_{oc} * f_{oc} \quad = 0.33573$$

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
K_{oc}	Chemical Specific TACO Appendix C Table E	cm^3/g	58.9
f_{oc} (Organic Carbon Content)	Field measurement or TACO Appendix C Table B	g/g	0.0057

The calculated Remediation Objective must now be compared to the C_{sat} value, the most restrict value will be the Tier 2 screening level.

Equation S29

$$C_{sat} = \frac{S}{\rho_b} * \left[(K_d * \rho_b) + \theta_w + (H' * \theta_a) \right]$$

= 807.1   (Calculated Value)
870   (TACO Value)

Where

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
S	Chemical Specific TACO Appendix C Table E	mg/L	1,750
K_d	See equation S19 above	L/kg	0.33573
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.17
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.19
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.7
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.228

Results:

Chemical Name	Remediation Objective	C_{sat}	Tier 2 Screening Level
Benzene	0.231	807.1	0.231

TACO SSL Model: Surface Soil Cleanup Objectives for Contaminants Based Upon the Migration to Groundwater Exposure Route

Compound/Analyte: Benzo(a)anthracene

Equation S17

$$\text{Re}\,mediationObjective = C_w * \left[K_d + \frac{\theta_w + \theta_a * H^{'}}{\rho_b} \right] = 196.61$$

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
C_w	See equation S18 below	mg/L	0.013
K_d	See equation S19 below	L/kg	15124.00000
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.15
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.28
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.5
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.000137

Equation S18

$$C_w = DF * GW_{obj} = 0.013$$
Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
DF	Default Value of 20 or Equation S22	unitless	20
GW_{obj}	TACO Appendix B Table E or Equation S23	mg/L	0.00065

Equation S19

$$K_d = K_{oc} * f_{oc} = 15124.00000$$
Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
K_{oc}	Chemical Specific TACO Appendix C Table E	cm^3/g	398000
f_{oc} (Organic Carbon Content)	Field measurement or TACO Appendix C Table B	g/g	0.038

The calculated Remediation Objective must now be compared to the C_{sat} value, the most restrict value will be the Tier 2 screening level.

Equation S29

$$C_{sat} = \frac{S}{\rho_b} * \left[(K_d * \rho_b) + \theta_w + (H' * \theta_a) \right]$$

= 142.2   (Calculated Value)

NA   (TACO Value)

Where

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
S	Chemical Specific TACO Appendix C Table E	mg/L	0.0094
K_d	See equation S19 above	L/kg	15124.00
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.15
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.28
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.5
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.000137

Results:

Chemical Name	Remediation Objective	C_{sat}	Tier 2 Screening Level
Benzo(a)anthracene	196.61	142.2	142.2

TACO SSL Model: Surface Soil Cleanup Objectives for Contaminants Based Upon the Migration to Groundwater Exposure Route

Compound/Analyte: Benzo(a)anthracene

Equation S17

$$\text{Re}\,mediationObjective = C_w * \left[K_d + \frac{\theta_w + \theta_a * H'}{\rho_b} \right] = 196.61$$

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
C_w	See equation S18 below	mg/L	0.013
K_d	See equation S19 below	L/kg	15124.00000
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.2
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.05
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	2
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.000137

Equation S18

$$C_w = DF * GW_{obj} = 0.013$$
Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
DF	Default Value of 20 or Equation S22	unitless	20
GW_{obj}	TACO Appendix B Table E or Equation S23	mg/L	0.00065

Equation S19

$$K_d = K_{oc} * f_{oc} = 15124.00000$$
Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
K_{oc}	Chemical Specific TACO Appendix C Table E	cm^3/g	398000
f_{oc} (Organic Carbon Content)	Field measurement or TACO Appendix C Table B	g/g	0.038

The calculated Remediation Objective must now be compared to the C_{sat} value, the most restrict value will be the Tier 2 screening level.

Equation S29

$$C_{sat} = \frac{S}{\rho_b} * [(K_d * \rho_b) + \theta_w + (H' * \theta_a)]$$

= 142.2   (Calculated Value)

NA   (TACO Value)

Where

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
S	Chemical Specific TACO Appendix C Table E	mg/L	0.0094
K_d	See equation S19 above	L/kg	15124.00000
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.2
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.05
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	2
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.000137

Results:

Chemical Name	Remediation Objective	C_{sat}	Tier 2 Screening Level
Benzo(a)anthracene	196.61	142.2	142.2

TACO SSL Model: Subsurface Soil Cleanup Objectives for Contaminants Based Upon the Migration to Groundwater Exposure Route

Compound/Analyte: Benzo(a)anthracene

Equation S17

$$\text{Re}\,mediationObjective = C_w * \left[K_d + \frac{\theta_w + \theta_a * H'}{\rho_b} \right]$$ = 29.493

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
C_w	See equation S18 below	mg/L	0.013
K_d	See equation S19 below	L/kg	2268.6
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.16
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.24
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.6
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.000137

Equation S18

$$C_w = DF * GW_{obj}$$ = 0.013

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
DF	Default Value of 20 or Equation S22	unitless	20
GW_{obj}	TACO Appendix B Table E or Equation S23	mg/L	0.00065

Equation S19

$$K_d = K_{oc} * f_{oc}$$ = 2268.6

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
K_{oc}	Chemical Specific TACO Appendix C Table E	cm^3/g	398000
f_{oc} (Organic Carbon Content)	Field measurement or TACO Appendix C Table B	g/g	0.0057

The calculated Remediation Objective must now be compared to the C_{sat} value, the most restrict value will be the Tier 2 screening level.

Equation S29

$$C_{sat} = \frac{S}{\rho_b} * \left[(K_d * \rho_b) + \theta_w + (H'*\theta_a) \right]$$

= 21.3 (Calculated Value)
NA (TACO Value)

Where

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
S	Chemical Specific TACO Appendix C Table E	mg/L	0.0094
K_d	See equation S19 above	L/kg	2268.6
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.16
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.24
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.6
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.000137

Results:

Chemical Name	Remediation Objective	C_{sat}	Tier 2 Screening Level
Benzo(a)anthracene	29.493	21.3	21.3

TACO SSL Model: Subsurface Soil Cleanup Objectives for Contaminants Based Upon the Migration to Groundwater Exposure Route

Compound/Analyte: Benzo(a)anthracene

Equation S17

$$Re\,mediationObjective = C_w * \left[K_d + \frac{\theta_w + \theta_a * H'}{\rho_b} \right] = 29.493$$

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
C_w	See equation S18 below	mg/L	0.013
K_d	See equation S19 below	L/kg	2268.6
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.17
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.19
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.7
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.000137

Equation S18

$$C_w = DF * GW_{obj} = 0.013$$

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
DF	Default Value of 20 or Equation S22	unitless	20
GW_{obj}	TACO Appendix B Table E or Equation S23	mg/L	0.00065

Equation S19

$$K_d = K_{oc} * f_{oc} = 2268.6$$

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
K_{oc}	Chemical Specific TACO Appendix C Table E	cm^3/g	398000
f_{oc} (Organic Carbon Content)	Field measurement or TACO Appendix C Table B	g/g	0.0057

The calculated Remediation Objective must now be compared to the C_{sat} value, the most restrict value will be the Tier 2 screening level.

Equation S29

$$C_{sat} = \frac{S}{\rho_b} * \left[(K_d * \rho_b) + \theta_w + (H' * \theta_a) \right]$$

= 21.3   (Calculated Value)

NA   (TACO Value)

Where

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
S	Chemical Specific TACO Appendix C Table E	mg/L	0.0094
K_d	See equation S19 above	L/kg	2268.6
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.17
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.19
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.7
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.000137

Results:

Chemical Name	Remediation Objective	C_{sat}	Tier 2 Screening Level
Benzo(a)anthracene	29.493	21.3	21.3

TACO SSL Model: Surface Soil Cleanup Objectives for Contaminants Based Upon the Migration to Groundwater Exposure Route

Compound/Analyte: Carbazole

Equation S17

$$Re\,mediationObjective = C_w * \left[K_d + \frac{\theta_w + \theta_a * H'}{\rho_b} \right]$$ = 51.568

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
C_w	See equation S18 below	mg/L	0.4
K_d	See equation S19 below	L/kg	128.82
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.15
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.28
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.5
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.000000626

Equation S18

$$C_w = DF * GW_{obj}$$ = 0.4

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
DF	Default Value of 20 or Equation S22	unitless	20
GW_{obj}	TACO Appendix B Table E or Equation S23	mg/L	0.02

Equation S19

$$K_d = K_{oc} * f_{oc}$$ = 128.82

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
K_{oc}	Chemical Specific TACO Appendix C Table E	cm^3/g	3390
f_{oc} (Organic Carbon Content)	Field measurement or TACO Appendix C Table B	g/g	0.038

The calculated Remediation Objective must now be compared to the C_{sat} value, the most restrict value will be the Tier 2 screening level.

Equation S29

$$C_{sat} = \frac{S}{\rho_b} * [(K_d * \rho_b) + \theta_w + (H' * \theta_a)]$$

= 964.3   (Calculated Value)

NA   (TACO Value)

Where

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
S	Chemical Specific TACO Appendix C Table E	mg/L	7.48
K_d	See equation S19 above	L/kg	128.82
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.15
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.28
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.5
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.000000626

Results:

Chemical Name	Remediation Objective	C_{sat}	Tier 2 Screening Level
Carbazole	51.568	964.3	51.568

TACO SSL Model: Surface Soil Cleanup Objectives for Contaminants Based Upon the Migration to Groundwater Exposure Route

Compound/Analyte: Carbazole

Equation S17

$$\text{Re } mediationObjective = C_w * \left[K_d + \frac{\theta_w + \theta_a * H'}{\rho_b} \right] \quad = 51.568$$

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
C_w	See equation S18 below	mg/L	0.4
K_d	See equation S19 below	L/kg	128.82
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.2
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.05
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	2
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.000000626

Equation S18

$$C_w = DF * GW_{obj} \quad = 0.4$$
Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
DF	Default Value of 20 or Equation S22	unitless	20
GW_{obj}	TACO Appendix B Table E or Equation S23	mg/L	0.02

Equation S19

$$K_d = K_{oc} * f_{oc} \quad = 128.82$$
Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
K_{oc}	Chemical Specific TACO Appendix C Table E	cm^3/g	3390
f_{oc} (Organic Carbon Content)	Field measurement or TACO Appendix C Table B	g/g	0.038

The calculated Remediation Objective must now be compared to the C_{sat} value, the most restrict value will be the Tier 2 screening level.

Equation S29

$$C_{sat} = \frac{S}{\rho_b} * \left[(K_d * \rho_b) + \theta_w + (H' * \theta_a) \right]$$

= 964.3   (Calculated Value)
NA   (TACO Value)

Where

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
S	Chemical Specific TACO Appendix C Table E	mg/L	7.48
K_d	See equation S19 above	L/kg	128.82
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.2
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.05
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	2
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.000000626

Results:

Chemical Name	Remediation Objective	C_{sat}	Tier 2 Screening Level
Carbazole	51.568	964.3	51.568

TACO SSL Model: Subsurface Soil Cleanup Objectives for Contaminants Based Upon the Migration to Groundwater Exposure Route

Compound/Analyte: Carbazole

Equation S17

$$\text{Re}\,mediation\,Objective = C_w * \left[K_d + \frac{\theta_w + \theta_a * H'}{\rho_b} \right] = 7.769$$

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
C_w	See equation S18 below	mg/L	0.4
K_d	See equation S19 below	L/kg	19.323
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.16
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.24
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.6
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.000000626

Equation S18

$$C_w = DF * GW_{obj} \quad = 0.4$$

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
DF	Default Value of 20 or Equation S22	unitless	20
GW_{obj}	TACO Appendix B Table E or Equation S23	mg/L	0.02

Equation S19

$$K_d = K_{oc} * f_{oc} \quad = 19.323$$

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
K_{oc}	Chemical Specific TACO Appendix C Table E	cm^3/g	3390
f_{oc} (Organic Carbon Content)	Field measurement or TACO Appendix C Table B	g/g	0.0057

The calculated Remediation Objective must now be compared to the C_{sat} value, the most restrict value will be the Tier 2 screening level.

Equation S29

$$C_{sat} = \frac{S}{\rho_b} * \left[(K_d * \rho_b) + \theta_w + (H' * \theta_a) \right]$$

= 145.3   (Calculated Value)

NA   (TACO Value)

Where

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
S	Chemical Specific TACO Appendix C Table E	mg/L	7.48
K_d	See equation S19 above	L/kg	19.323
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.16
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.24
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.6
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.000000626

Results:

Chemical Name	Remediation Objective	C_{sat}	Tier 2 Screening Level
Carbazole	7.769	145.3	7.769

TACO SSL Model: Subsurface Soil Cleanup Objectives for Contaminants Based Upon the Migration to Groundwater Exposure Route

Compound/Analyte: Carbazole

Equation S17

$$\text{Re}\, mediation Objective = C_w * \left[K_d + \frac{\theta_w + \theta_a * H'}{\rho_b} \right] = 7.769$$

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
C_w	See equation S18 below	mg/L	0.4
K_d	See equation S19 below	L/kg	19.323
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.17
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.19
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.7
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.000000626

Equation S18

$$C_w = DF * GW_{obj} = 0.4$$

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
DF	Default Value of 20 or Equation S22	unitless	20
GW_{obj}	TACO Appendix B Table E or Equation S23	mg/L	0.02

Equation S19

$$K_d = K_{oc} * f_{oc} = 19.323$$

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
K_{oc}	Chemical Specific TACO Appendix C Table E	cm^3/g	3390
f_{oc} (Organic Carbon Content)	Field measurement or TACO Appendix C Table B	g/g	0.0057

The calculated Remediation Objective must now be compared to the C_{sat} value, the most restrict value will be the Tier 2 screening level.

Equation S29

$$C_{sat} = \frac{S}{\rho_b} * \left[(K_d * \rho_b) + \theta_w + (H' * \theta_a) \right]$$

= 145.3   (Calculated Value)

NA   (TACO Value)

Where

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
S	Chemical Specific TACO Appendix C Table E	mg/L	7.48
K_d	See equation S19 above	L/kg	19.323
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.17
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.19
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.7
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.000000626

Results:

Chemical Name	Remediation Objective	C_{sat}	Tier 2 Screening Level
Carbazole	7.769	145.3	7.769

TACO SSL Model: Surface Soil Cleanup Objectives for Contaminants Based Upon the Migration to Groundwater Exposure Route

Compound/Analyte: Dibenzo(a,h)anthracene

Equation S17

$$\mathrm{Re}\, mediation Objective = C_w * \left[K_d + \frac{\theta_w + \theta_a * H^{'}}{\rho_b} \right]$$ = 4332.00

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
C_w	See equation S18 below	mg/L	0.03
K_d	See equation S19 below	L/kg	144400.00
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.15
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.28
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.5
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.000000603

Equation S18

$C_w = DF * GW_{obj}$ = 0.03

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
DF	Default Value of 20 or Equation S22	unitless	20
GW_{obj}	TACO Appendix B Table E or Equation S23	mg/L	0.0015

Equation S19

$K_d = K_{oc} * f_{oc}$ = 144400.00000

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
K_{oc}	Chemical Specific TACO Appendix C Table E	cm^3/g	3800000
f_{oc} (Organic Carbon Content)	Field measurement or TACO Appendix C Table B	g/g	0.038

The calculated Remediation Objective must now be compared to the C_{sat} value, the most restrict value will be the Tier 2 screening level.

Equation S29

$$C_{sat} = \frac{S}{\rho_b} * [(K_d * \rho_b) + \theta_w + (H' * \theta_a)]$$

= 359.6   (Calculated Value)

NA   (TACO Value)

Where

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
S	Chemical Specific TACO Appendix C Table E	mg/L	0.00249
K_d	See equation S19 above	L/kg	144400.00
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.15
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.28
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.5
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.000000603

Results:

Chemical Name	Remediation Objective	C_{sat}	Tier 2 Screening Level
Dibenzo(a,h)anthracene	4332.00	359.6	359.6

TACO SSL Model: Surface Soil Cleanup Objectives for Contaminants Based Upon the Migration to Groundwater Exposure Route

Compound/Analyte: Ethylbenzene

Equation S17

$$\text{Re}\,mediationObjective = C_w * \left[K_d + \frac{\theta_w + \theta_a * H'}{\rho_b} \right] = 279.0859$$

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
C_w	See equation S18 below	mg/L	20
K_d	See equation S19 below	L/kg	13.794
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.15
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.28
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.5
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.323

Equation S18

$$C_w = DF * GW_{obj} = 20$$

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
DF	Default Value of 20 or Equation S22	unitless	20
GW$_{obj}$	TACO Appendix B Table E or Equation S23	mg/L	1

Equation S19

$$K_d = K_{oc} * f_{oc} = 13.794$$

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
K_{oc}	Chemical Specific TACO Appendix C Table E	cm^3/g	363
f_{oc} (Organic Carbon Content)	Field measurement or TACO Appendix C Table B	g/g	0.038

The calculated Remediation Objective must now be compared to the C_{sat} value, the most restrict value will be the Tier 2 screening level.

Equation S29

$$C_{sat} = \frac{S}{\rho_b} * \left[(K_d * \rho_b) + \theta_w + (H' * \theta_a) \right]$$

     = 2358.3   (Calculated Value)
        400   (TACO Value)

Where

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
S	Chemical Specific TACO Appendix C Table E	mg/L	169
K_d	See equation S19 above	L/kg	13.794
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.15
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.28
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.5
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.323

Results:

Chemical Name	Remediation Objective	C_{sat}	Tier 2 Screening Level
Ethylbenzene	279.0859	400.0	279.0859

TACO SSL Model: Surface Soil Cleanup Objectives for Contaminants Based Upon the Migration to Groundwater Exposure Route

Compound/Analyte: Ethylbenzene

Equation S17

$$Re\,mediationObjective = C_w * \left[K_d + \frac{\theta_w + \theta_a * H'}{\rho_b} \right] = 278.0415$$

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
C_w	See equation S18 below	mg/L	20
K_d	See equation S19 below	L/kg	13.794
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.2
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.05
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	2
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.323

Equation S18

$$C_w = DF * GW_{obj} = 20$$
Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
DF	Default Value of 20 or Equation S22	unitless	20
GW_{obj}	TACO Appendix B Table E or Equation S23	mg/L	1

Equation S19

$$K_d = K_{oc} * f_{oc} = 13.794$$
Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
K_{oc}	Chemical Specific TACO Appendix C Table E	cm^3/g	363
f_{oc} (Organic Carbon Content)	Field measurement or TACO Appendix C Table B	g/g	0.038

The calculated Remediation Objective must now be compared to the C_{sat} value, the most restrict value will be the Tier 2 screening level.

Equation S29

$$C_{sat} = \frac{S}{\rho_b} * \left[(K_d * \rho_b) + \theta_w + (H' * \theta_a) \right]$$

= 2349.5   (Calculated Value)

400   (TACO Value)

Where

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
S	Chemical Specific TACO Appendix C Table E	mg/L	169
K_d	See equation S19 above	L/kg	13.794
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.2
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.05
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	2
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.323

Results:

Chemical Name	Remediation Objective	C_{sat}	Tier 2 Screening Level
Ethylbenzene	278.0415	400.0	278.0415

TACO SSL Model: Subsurface Soil Cleanup Objectives for Contaminants Based Upon the Migration to Groundwater Exposure Route

Compound/Analyte: Ethylbenzene

Equation S17

$$\text{Re}\,mediation\,Objective = C_w * \left[K_d + \frac{\theta_w + \theta_a * H^{'}}{\rho_b} \right]$$ = 44.351

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
C_w	See equation S18 below	mg/L	20
K_d	See equation S19 below	L/kg	2.0691
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.16
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.24
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.6
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.323

Equation S18

$$C_w = DF * GW_{obj}$$ = 20

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
DF	Default Value of 20 or Equation S22	unitless	20
GW_{obj}	TACO Appendix B Table E or Equation S23	mg/L	1

Equation S19

$$K_d = K_{oc} * f_{oc}$$ = 2.0691

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
K_{oc}	Chemical Specific TACO Appendix C Table E	cm^3/g	363
f_{oc} (Organic Carbon Content)	Field measurement or TACO Appendix C Table B	g/g	0.0057

The calculated Remediation Objective must now be compared to the C_{sat} value, the most restrict value will be the Tier 2 screening level.

Equation S29

$$C_{sat} = \frac{S}{\rho_b} * [(K_d * \rho_b) + \theta_w + (H' * \theta_a)]$$

| | = 374.8 | (Calculated Value) |
| | 400 | (TACO Value) |

Where

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
S	Chemical Specific TACO Appendix C Table E	mg/L	169
K_d	See equation S19 above	L/kg	2.0691
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.16
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.24
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.6
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.323

Results:

Chemical Name	Remediation Objective	C_{sat}	Tier 2 Screening Level
Ethylbenzene	44.351	374.8	44.351

TACO SSL Model: Subsurface Soil Cleanup Objectives for Contaminants Based Upon the Migration to Groundwater Exposure Route

Compound/Analyte: Ethylbenzene

Equation S17

$$\text{Re}\,mediation\,Objective = C_w * \left[K_d + \frac{\theta_w + \theta_a * H^{'}}{\rho_b} \right] = 44.104$$

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
C_w	See equation S18 below	mg/L	20
K_d	See equation S19 below	L/kg	2.0691
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.17
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.19
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.7
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.323

Equation S18

$$C_w = DF * GW_{obj} \quad = 20$$

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
DF	Default Value of 20 or Equation S22	unitless	20
GW_{obj}	TACO Appendix B Table E or Equation S23	mg/L	1

Equation S19

$$K_d = K_{oc} * f_{oc} \quad = 2.0691$$

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
K_{oc}	Chemical Specific TACO Appendix C Table E	cm^3/g	363
f_{oc} (Organic Carbon Content)	Field measurement or TACO Appendix C Table B	g/g	0.0057

The calculated Remediation Objective must now be compared to the C_{sat} value, the most restrict value will be the Tier 2 screening level.

Equation S29

$$C_{sat} = \frac{S}{\rho_b} * [(K_d * \rho_b) + \theta_w + (H' * \theta_a)]$$

= 372.7   (Calculated Value)
400   (TACO Value)

Where

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
S	Chemical Specific TACO Appendix C Table E	mg/L	169
K_d	See equation S19 above	L/kg	2.0691
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.17
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.19
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.7
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.323

Results:

Chemical Name	Remediation Objective	C_{sat}	Tier 2 Screening Level
Ethylbenzene	44.104	372.7	44.104

TACO SSL Model: Surface Soil Cleanup Objectives for Contaminants Based Upon the Migration to Groundwater Exposure Route

Compound/Analyte: Naphthalene

Equation S17

$$\text{Re}\, mediationObjective = C_w * \left[K_d + \frac{\theta_w + \theta_a * H'}{\rho_b} \right]$$ = 334.86

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
C_w	See equation S18 below	mg/L	4.4
K_d	See equation S19 below	L/kg	76.00
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.15
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.28
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.5
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.0198

Equation S18

$C_w = DF * GW_{obj}$ = 4.4

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
DF	Default Value of 20 or Equation S22	unitless	20
GW_{obj}	TACO Appendix B Table E or Equation S23	mg/L	0.22

Equation S19

$K_d = K_{oc} * f_{oc}$ = 76.00

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
K_{oc}	Chemical Specific TACO Appendix C Table E	cm^3/g	2000
f_{oc} (Organic Carbon Content)	Field measurement or TACO Appendix C Table B	g/g	0.038

The calculated Remediation Objective must now be compared to the C_{sat} value, the most restrict value will be the Tier 2 screening level.

Equation S29

$$C_{sat} = \frac{S}{\rho_b} * \left[\left(K_d * \rho_b \right) + \theta_w + \left(H' * \theta_a \right) \right]$$

= 2359.2   (Calculated Value)

NA   (TACO Value)

Where

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
S	Chemical Specific TACO Appendix C Table E	mg/L	31.00
K_d	See equation S19 above	L/kg	76.00
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.15
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.28
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.5
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.0198

Results:

Chemical Name	Remediation Objective	C_{sat}	Tier 2 Screening Level
Naphthalene	334.86	2359.2	334.86

TACO SSL Model: Surface Soil Cleanup Objectives for Contaminants Based Upon the Migration to Groundwater Exposure Route

Compound/Analyte: Naphthalene

Equation S17

$$\text{Re } mediationObjective = C_w * \left[K_d + \frac{\theta_w + \theta_a * H^{'}}{\rho_b} \right]$$ = 334.84

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
C_w	See equation S18 below	mg/L	4.4
K_d	See equation S19 below	L/kg	76.00000
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.2
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.05
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	2
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.0198

Equation S18

$$C_w = DF * GW_{obj}$$ = 4.4

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
DF	Default Value of 20 or Equation S22	unitless	20
GW_{obj}	TACO Appendix B Table E or Equation S23	mg/L	0.22

Equation S19

$$K_d = K_{oc} * f_{oc}$$ = 76.00

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
K_{oc}	Chemical Specific TACO Appendix C Table E	cm^3/g	2000
f_{oc} (Organic Carbon Content)	Field measurement or TACO Appendix C Table B	g/g	0.038

The calculated Remediation Objective must now be compared to the C_{sat} value, the most restrict value will be the Tier 2 screening level.

Equation S29

$$C_{sat} = \frac{S}{\rho_b} * [(K_d * \rho_b) + \theta_w + (H' * \theta_a)]$$

= 2359.1   (Calculated Value)

NA   (TACO Value)

Where

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
S	Chemical Specific TACO Appendix C Table E	mg/L	31.00
K_d	See equation S19 above	L/kg	76.00000
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.2
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.05
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	2
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.0198

Results:

Chemical Name	Remediation Objective	C_{sat}	Tier 2 Screening Level
Naphthalene	334.84	2359.1	334.84

TACO SSL Model: Subsurface Soil Cleanup Objectives for Contaminants Based Upon the Migration to Groundwater Exposure Route

Compound/Analyte: Naphthalene

Equation S17

$$\mathrm{Re}\,mediationObjective = C_w * \left[K_d + \frac{\theta_w + \theta_a * H'}{\rho_b} \right] \quad = 50.613$$

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
C_w	See equation S18 below	mg/L	4.4
K_d	See equation S19 below	L/kg	11.4
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.16
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.24
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.6
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.0198

Equation S18

$$C_w = DF * GW_{obj} \quad = 4.4$$
Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
DF	Default Value of 20 or Equation S22	unitless	20
GW_{obj}	TACO Appendix B Table E or Equation S23	mg/L	0.22

Equation S19

$$K_d = K_{oc} * f_{oc} \quad = 11.40$$
Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
K_{oc}	Chemical Specific TACO Appendix C Table E	cm^3/g	2000
f_{oc} (Organic Carbon Content)	Field measurement or TACO Appendix C Table B	g/g	0.0057

The calculated Remediation Objective must now be compared to the C_{sat} value, the most restrict value will be the Tier 2 screening level.

Equation S29

$$C_{sat} = \frac{S}{\rho_b} * \left[\left(K_d * \rho_b \right) + \theta_w + \left(H' * \theta_a \right) \right]$$

= 356.6   (Calculated Value)

NA   (TACO Value)

Where

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
S	Chemical Specific TACO Appendix C Table E	mg/L	31.00
K_d	See equation S19 above	L/kg	11.4
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.16
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.24
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.6
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.0198

Results:

Chemical Name	Remediation Objective	C_{sat}	Tier 2 Screening Level
Naphthalene	50.613	356.6	50.613

TACO SSL Model: Subsurface Soil Cleanup Objectives for Contaminants Based Upon the Migration to Groundwater Exposure Route

Compound/Analyte: Naphthalene

Equation S17

$$\text{Re}\,mediation\,Objective = C_w * \left[K_d + \frac{\theta_w + \theta_a * H'}{\rho_b} \right]$$

= 50.610

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
C_w	See equation S18 below	mg/L	4.4
K_d	See equation S19 below	L/kg	11.4
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.17
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.19
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.7
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.0198

Equation S18

$$C_w = DF * GW_{obj}$$ = 4.4

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
DF	Default Value of 20 or Equation S22	unitless	20
GW_{obj}	TACO Appendix B Table E or Equation S23	mg/L	0.22

Equation S19

$$K_d = K_{oc} * f_{oc}$$ = 11.40

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
K_{oc}	Chemical Specific TACO Appendix C Table E	cm^3/g	2000
f_{oc} (Organic Carbon Content)	Field measurement or TACO Appendix C Table B	g/g	0.0057

The calculated Remediation Objective must now be compared to the C_{sat} value, the most restrict value will be the Tier 2 screening level.

Equation S29

$$C_{sat} = \frac{S}{\rho_b} * \left[(K_d * \rho_b) + \theta_w + (H' * \theta_a) \right]$$

    = 356.6   (Calculated Value)
    NA   (TACO Value)

Where

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
S	Chemical Specific TACO Appendix C Table E	mg/L	31.00
K_d	See equation S19 above	L/kg	11.4
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.17
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.19
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.7
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.0198

Results:

Chemical Name	Remediation Objective	C_{sat}	Tier 2 Screening Level
Naphthalene	50.610	356.6	50.610

TACO SSL Model: Surface Soil Cleanup Objectives for Contaminants Based Upon the Migration to Groundwater Exposure Route

Compound/Analyte: Tetrachloroethene

Equation S17

$$\mathrm{Re}\,mediationObjective = C_w * \left[K_d + \frac{\theta_w + \theta_a * H'}{\rho_b} \right]$$ = 3.07

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
C_w	See equation S18 below	mg/L	0.5
K_d	See equation S19 below	L/kg	5.89000
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.15
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.28
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.5
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.754

Equation S18

$C_w = DF * GW_{obj}$ = 0.5

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
DF	Default Value of 20 or Equation S22	unitless	20
GW_{obj}	TACO Appendix B Table E or Equation S23	mg/L	0.025

Equation S19

$K_d = K_{oc} * f_{oc}$ = 5.89000

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
K_{oc}	Chemical Specific TACO Appendix C Table E	cm^3/g	155
f_{oc} (Organic Carbon Content)	Field measurement or TACO Appendix C Table B	g/g	0.038

The calculated Remediation Objective must now be compared to the C_{sat} value, the most restrict value will be the Tier 2 screening level.

Equation S29

$$C_{sat} = \frac{S}{\rho_b} * [(K_d * \rho_b) + \theta_w + (H'*\theta_a)]$$

= 1226.1   (Calculated Value)
240   (TACO Value)

Where

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
S	Chemical Specific TACO Appendix C Table E	mg/L	200
K_d	See equation S19 above	L/kg	5.89000
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.15
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.28
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.5
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.754

Results:

Chemical Name	Remediation Objective	C_{sat}	Tier 2 Screening Level
Tetrachloroethene	3.07	240.0	3.07

TACO SSL Model: Surface Soil Cleanup Objectives for Contaminants Based Upon the Migration to Groundwater Exposure Route

Compound/Analyte: Tetrachloroethene

Equation S17

$$Re \, mediation Objective = C_w * \left[K_d + \frac{\theta_w + \theta_a * H'}{\rho_b} \right] = 3.00$$

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
C_w	See equation S18 below	mg/L	0.5
K_d	See equation S19 below	L/kg	5.89000
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.2
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.05
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	2
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.754

Equation S18

$$C_w = DF * GW_{obj} = 0.5$$

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
DF	Default Value of 20 or Equation S22	unitless	20
GW_{obj}	TACO Appendix B Table E or Equation S23	mg/L	0.025

Equation S19

$$K_d = K_{oc} * f_{oc} = 5.89000$$

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
K_{oc}	Chemical Specific TACO Appendix C Table E	cm^3/g	155
f_{oc} (Organic Carbon Content)	Field measurement or TACO Appendix C Table B	g/g	0.038

The calculated Remediation Objective must now be compared to the C_{sat} value, the most restrict value will be the Tier 2 screening level.

Equation S29

$$C_{sat} = \frac{S}{\rho_b} * \left[(K_d * \rho_b) + \theta_w + (H' * \theta_a) \right]$$

| = 1201.8 | (Calculated Value) |
| 240 | (TACO Value) |

Where

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
S	Chemical Specific TACO Appendix C Table E	mg/L	200
K_d	See equation S19 above	L/kg	5.89000
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.2
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.05
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	2
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.754

Results:

Chemical Name	Remediation Objective	C_{sat}	Tier 2 Screening Level
Tetrachloroethene	3.00	240.0	3.00

TACO SSL Model: Subsurface Soil Cleanup Objectives for Contaminants Based Upon the Migration to Groundwater Exposure Route

Compound/Analyte: Tetrachloroethene

Equation S17

$$\mathrm{Re}\,mediationObjective = C_w * \left[K_d + \frac{\theta_w + \theta_a * H'}{\rho_b} \right] = 0.548$$

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
C_w	See equation S18 below	mg/L	0.5
K_d	See equation S19 below	L/kg	0.8835
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.16
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.24
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.6
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.754

Equation S18

$$C_w = DF * GW_{obj} = 0.5$$

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
DF	Default Value of 20 or Equation S22	unitless	20
GW_{obj}	TACO Appendix B Table E or Equation S23	mg/L	0.025

Equation S19

$$K_d = K_{oc} * f_{oc} = 0.8835$$

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
K_{oc}	Chemical Specific TACO Appendix C Table E	cm^3/g	155
f_{oc} (Organic Carbon Content)	Field measurement or TACO Appendix C Table B	g/g	0.0057

The calculated Remediation Objective must now be compared to the C_{sat} value, the most restrict value will be the Tier 2 screening level.

Equation S29

$$C_{sat} = \frac{S}{\rho_b} * \left[(K_d * \rho_b) + \theta_w + (H' * \theta_a) \right]$$

= 219.3	(Calculated Value)
240	(TACO Value)

Where

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
S	Chemical Specific TACO Appendix C Table E	mg/L	200
K_d	See equation S19 above	L/kg	0.8835
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.16
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.24
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.6
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.754

Results:

Chemical Name	Remediation Objective	C_{sat}	Tier 2 Screening Level
Tetrachloroethene	0.548	219.3	0.548

TACO SSL Model: Subsurface Soil Cleanup Objectives for Contaminants Based Upon the Migration to Groundwater Exposure Route

Compound/Analyte: Tetrachloroethene

Equation S17

$$\mathrm{Re}\,mediationObjective = C_w * \left[K_d + \frac{\theta_w + \theta_a * H'}{\rho_b} \right] \quad = 0.534$$

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
C_w	See equation S18 below	mg/L	0.5
K_d	See equation S19 below	L/kg	0.8835
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.17
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.19
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.7
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.754

Equation S18

$$C_w = DF * GW_{obj} \quad = 0.5$$

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
DF	Default Value of 20 or Equation S22	unitless	20
GW_{obj}	TACO Appendix B Table E or Equation S23	mg/L	0.025

Equation S19

$$K_d = K_{oc} * f_{oc} \quad = 0.8835$$

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
K_{oc}	Chemical Specific TACO Appendix C Table E	cm^3/g	155
f_{oc} (Organic Carbon Content)	Field measurement or TACO Appendix C Table B	g/g	0.0057

The calculated Remediation Objective must now be compared to the C_{sat} value, the most restrict value will be the Tier 2 screening level.

Equation S29

$$C_{sat} = \frac{S}{\rho_b} * \left[(K_d * \rho_b) + \theta_w + (H' * \theta_a) \right]$$

= 213.6   (Calculated Value)
240   (TACO Value)

Where

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
S	Chemical Specific TACO Appendix C Table E	mg/L	200
K_d	See equation S19 above	L/kg	0.8835
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.17
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.19
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.7
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.754

Results:

Chemical Name	Remediation Objective	C_{sat}	Tier 2 Screening Level
Tetrachloroethene	0.534	213.6	0.534

TACO SSL Model: Surface Soil Cleanup Objectives for Contaminants Based Upon the Migration to Groundwater Exposure Route

Compound/Analyte: Toluene

Equation S17

$$\mathrm{Re}\,mediationObjective = C_w * \left[K_d + \frac{\theta_w + \theta_a * H'}{\rho_b} \right] \quad = 353.339$$

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
C_w	See equation S18 below	mg/L	50
K_d	See equation S19 below	L/kg	6.916
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.15
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.28
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.5
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.272

Equation S18

$$C_w = DF * GW_{obj} \quad = 50$$
Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
DF	Default Value of 20 or Equation S22	unitless	20
GW_{obj}	TACO Appendix B Table E or Equation S23	mg/L	2.5

Equation S19

$$K_d = K_{oc} * f_{oc} \quad = 6.916$$
Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
K_{oc}	Chemical Specific TACO Appendix C Table E	cm^3/g	182
f_{oc} (Organic Carbon Content)	Field measurement or TACO Appendix C Table B	g/g	0.038

The calculated Remediation Objective must now be compared to the C_{sat} value, the most restrict value will be the Tier 2 screening level.

Equation S29

$$C_{sat} = \frac{S}{\rho_b} * \left[\left(K_d * \rho_b \right) + \theta_w + \left(H' * \theta_a \right) \right]$$

= 3717.1   (Calculated Value)
650   (TACO Value)

Where

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
S	Chemical Specific TACO Appendix C Table E	mg/L	526
K_d	See equation S19 above	L/kg	6.916
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.15
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.28
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.5
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.272

Results:

Chemical Name	Remediation Objective	C_{sat}	Tier 2 Screening Level
Toluene	353.339	650.0	353.339

TACO SSL Model: Surface Soil Cleanup Objectives for Contaminants Based Upon the Migration to Groundwater Exposure Route

Compound/Analyte: Toluene

Equation S17

$$\mathrm{Re}\,mediationObjective = C_w * \left[K_d + \frac{\theta_w + \theta_a * H'}{\rho_b} \right] \quad = 351.140$$

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
C_w	See equation S18 below	mg/L	50
K_d	See equation S19 below	L/kg	6.916
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.2
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.05
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	2
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.272

Equation S18

$$C_w = DF * GW_{obj} \quad = 50$$
Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
DF	Default Value of 20 or Equation S22	unitless	20
GW_{obj}	TACO Appendix B Table E or Equation S23	mg/L	2.5

Equation S19

$$K_d = K_{oc} * f_{oc} \quad = 6.916$$
Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
K_{oc}	Chemical Specific TACO Appendix C Table E	cm^3/g	182
f_{oc} (Organic Carbon Content)	Field measurement or TACO Appendix C Table B	g/g	0.038

The calculated Remediation Objective must now be compared to the C_{sat} value, the most restrict value will be the Tier 2 screening level.

Equation S29

$$C_{sat} = \frac{S}{\rho_b} * \left[\left(K_d * \rho_b \right) + \theta_w + \left(H' * \theta_a \right) \right]$$

$= 3694.0$ (Calculated Value)
650 (TACO Value)

Where

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
S	Chemical Specific TACO Appendix C Table E	mg/L	526
K_d	See equation S19 above	L/kg	6.916
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.2
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.05
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	2
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.272

Results:

Chemical Name	Remediation Objective	C_{sat}	Tier 2 Screening Level
Toluene	351.140	650.0	351.140

TACO SSL Model: Subsurface Soil Cleanup Objectives for Contaminants Based Upon the Migration to Groundwater Exposure Route

Compound/Analyte: Toluene

Equation S17

$$\text{Re}\,mediation\,Objective = C_w * \left[K_d + \frac{\theta_w + \theta_a * H^{'}}{\rho_b} \right] = 58.910$$

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
C_w	See equation S18 below	mg/L	50
K_d	See equation S19 below	L/kg	1.0374
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.16
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.24
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.6
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.272

Equation S18

$$C_w = DF * GW_{obj} \quad = 50$$

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
DF	Default Value of 20 or Equation S22	unitless	20
GW_{obj}	TACO Appendix B Table E or Equation S23	mg/L	2.5

Equation S19

$$K_d = K_{oc} * f_{oc} \quad = 1.0374$$

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
K_{oc}	Chemical Specific TACO Appendix C Table E	cm^3/g	182
f_{oc} (Organic Carbon Content)	Field measurement or TACO Appendix C Table B	g/g	0.0057

The calculated Remediation Objective must now be compared to the C_{sat} value, the most restrict value will be the Tier 2 screening level.

Equation S29

$$C_{sat} = \frac{S}{\rho_b} * \left[(K_d * \rho_b) + \theta_w + (H' * \theta_a) \right]$$

$= 619.7$ (Calculated Value)

650 (TACO Value)

Where

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
S	Chemical Specific TACO Appendix C Table E	mg/L	526
K_d	See equation S19 above	L/kg	1.0374
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.16
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.24
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.6
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.272

Results:

Chemical Name	Remediation Objective	C_{sat}	Tier 2 Screening Level
Toluene	58.910	619.7	58.910

TACO SSL Model: Subsurface Soil Cleanup Objectives for Contaminants Based Upon the Migration to Groundwater Exposure Route

Compound/Analyte: Toluene

Equation S17

$$\mathrm{Re}\,mediation\,Objective = C_w * \left[K_d + \frac{\theta_w + \theta_a * H'}{\rho_b} \right]$$ = 58.390

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
C_w	See equation S18 below	mg/L	50
K_d	See equation S19 below	L/kg	1.0374
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.17
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.19
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.7
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.272

Equation S18

$$C_w = DF * GW_{obj}$$ = 50

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
DF	Default Value of 20 or Equation S22	unitless	20
GW_{obj}	TACO Appendix B Table E or Equation S23	mg/L	2.5

Equation S19

$$K_d = K_{oc} * f_{oc}$$ = 1.0374

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
K_{oc}	Chemical Specific TACO Appendix C Table E	cm^3/g	182
f_{oc} (Organic Carbon Content)	Field measurement or TACO Appendix C Table B	g/g	0.0057

The calculated Remediation Objective must now be compared to the C_{sat} value, the most restrict value will be the Tier 2 screening level.

Equation S29

$$C_{sat} = \frac{S}{\rho_b} * [(K_d * \rho_b) + \theta_w + (H' * \theta_a)]$$

= 614.3   (Calculated Value)
650   (TACO Value)

Where

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
S	Chemical Specific TACO Appendix C Table E	mg/L	526
K_d	See equation S19 above	L/kg	1.0374
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.17
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.19
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.7
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.272

Results:

Chemical Name	Remediation Objective	C_{sat}	Tier 2 Screening Level
Toluene	58.390	614.3	58.390

TACO SSL Model: Surface Soil Cleanup Objectives for Contaminants Based Upon the Migration to Groundwater Exposure Route

Compound/Analyte: Xylenes

Equation S17

$$\mathrm{Re}\,mediationObjective = C_w * \left[K_d + \frac{\theta_w + \theta_a * H'}{\rho_b} \right] = 2005.333$$

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
C_w	See equation S18 below	mg/L	200
K_d	See equation S19 below	L/kg	9.88
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.15
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.28
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.5
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.25

Equation S18

$$C_w = DF * GW_{obj} = 200$$
Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
DF	Default Value of 20 or Equation S22	unitless	20
GW$_{obj}$	TACO Appendix B Table E or Equation S23	mg/L	10

Equation S19

$$K_d = K_{oc} * f_{oc} = 9.88$$
Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
K$_{oc}$	Chemical Specific TACO Appendix C Table E	cm^3/g	260
f$_{oc}$ (Organic Carbon Content)	Field measurement or TACO Appendix C Table B	g/g	0.038

The calculated Remediation Objective must now be compared to the C_{sat} value, the most restrict value will be the Tier 2 screening level.

Equation S29

$$C_{sat} = \frac{S}{\rho_b} * [(K_d * \rho_b) + \theta_w + (H' * \theta_a)]$$

= 1865.0   (Calculated Value)

320   (TACO Value)

Where

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
S	Chemical Specific TACO Appendix C Table E	mg/L	186
K_d	See equation S19 above	L/kg	9.88
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.15
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.28
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.5
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.25

Results:

Chemical Name	Remediation Objective	C_{sat}	Tier 2 Screening Level
Xylenes	2005.3	320.0	320.00

TACO SSL Model: Surface Soil Cleanup Objectives for Contaminants Based Upon the Migration to Groundwater Exposure Route

Compound/Analyte: Xylenes

Equation S17

$$\mathrm{Re}\,mediationObjective = C_w * \left[K_d + \frac{\theta_w + \theta_a * H'}{\rho_b} \right] \quad = 1997.250$$

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
C_w	See equation S18 below	mg/L	200
K_d	See equation S19 below	L/kg	9.88
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.2
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.05
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	2
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.25

Equation S18

$$C_w = DF * GW_{obj} \quad = 200$$
Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
DF	Default Value of 20 or Equation S22	unitless	20
GW_{obj}	TACO Appendix B Table E or Equation S23	mg/L	10

Equation S19

$$K_d = K_{oc} * f_{oc} \quad = 9.88$$
Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
K_{oc}	Chemical Specific TACO Appendix C Table E	cm^3/g	260
f_{oc} (Organic Carbon Content)	Field measurement or TACO Appendix C Table B	g/g	0.038

The calculated Remediation Objective must now be compared to the C_{sat} value, the most restrict value will be the Tier 2 screening level.

Equation S29

$$C_{sat} = \frac{S}{\rho_b} * \left[(K_d * \rho_b) + \theta_w + (H' * \theta_a) \right]$$

= 1857.4 (Calculated Value)

320 (TACO Value)

Where

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
S	Chemical Specific TACO Appendix C Table E	mg/L	186
K_d	See equation S19 above	L/kg	9.88
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.2
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.05
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	2
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.25

Results:

Chemical Name	Remediation Objective	C_{sat}	Tier 2 Screening Level
Xylenes	1997.3	320.0	320

TACO SSL Model: Subsurface Soil Cleanup Objectives for Contaminants Based Upon the Migration to Groundwater Exposure Route

Compound/Analyte: Xylenes

Equation S17

$$\mathrm{Re}\,mediation\,Objective = C_w * \left[K_d + \frac{\theta_w + \theta_a * H^{'}}{\rho_b} \right]$$ = 323.9

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
C_w	See equation S18 below	mg/L	200
K_d	See equation S19 below	L/kg	1.482
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.16
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.24
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.6
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.25

Equation S18

$$C_w = DF * GW_{obj}$$ = 200

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
DF	Default Value of 20 or Equation S22	unitless	20
GW_{obj}	TACO Appendix B Table E or Equation S23	mg/L	10

Equation S19

$$K_d = K_{oc} * f_{oc}$$ = 1.482

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
K_{oc}	Chemical Specific TACO Appendix C Table E	cm^3/g	260
f_{oc} (Organic Carbon Content)	Field measurement or TACO Appendix C Table B	g/g	0.0057

The calculated Remediation Objective must now be compared to the C_{sat} value, the most restrict value will be the Tier 2 screening level.

Equation S29

$$C_{sat} = \frac{S}{\rho_b} * [(K_d * \rho_b) + \theta_w + (H'*\theta_a)]$$

= 301.2   (Calculated Value)
320   (TACO Value)

Where

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
S	Chemical Specific TACO Appendix C Table E	mg/L	186
K_d	See equation S19 above	L/kg	1.482
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.16
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.24
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.6
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.25

Results:

Chemical Name	Remediation Objective	C_{sat}	Tier 2 Screening Level
Xylenes	323.9	301.2	301.20

TACO SSL Model: Subsurface Soil Cleanup Objectives for Contaminants Based Upon the Migration to Groundwater Exposure Route

Compound/Analyte: Xylenes

Equation S17

$$\text{Re}\,mediation Objective = C_w * \left[K_d + \frac{\theta_w + \theta_a * H^{'}}{\rho_b} \right] = 322.0$$

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
C_w	See equation S18 below	mg/L	200
K_d	See equation S19 below	L/kg	1.482
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.17
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.19
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.7
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.25

Equation S18

$$C_w = DF * GW_{obj} = 200$$
Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
DF	Default Value of 20 or Equation S22	unitless	20
GW_{obj}	TACO Appendix B Table E or Equation S23	mg/L	10

Equation S19

$$K_d = K_{oc} * f_{oc} = 1.482$$
Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
K_{oc}	Chemical Specific TACO Appendix C Table E	cm^3/g	260
f_{oc} (Organic Carbon Content)	Field measurement or TACO Appendix C Table B	g/g	0.0057

The calculated Remediation Objective must now be compared to the C$_{sat}$ value, the most restrict value will be the Tier 2 screening level.

Equation S29

$$C_{sat} = \frac{S}{\rho_b} * \left[(K_d * \rho_b) + \theta_w + (H'*\theta_a) \right]$$

= 299.4   (Calculated Value)
320   (TACO Value)

Where

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
S	Chemical Specific TACO Appendix C Table E	mg/L	186
K$_d$	See equation S19 above	L/kg	1.482
q$_w$ (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L$_{water}$/L$_{soil}$	0.17
q$_a$ (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L$_{air}$/L$_{soil}$	0.19
r$_b$ (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.7
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.25

Results:

Chemical Name	Remediation Objective	C$_{sat}$	Tier 2 Screening Level
Xylenes	322.0	299.4	299.4

TACO SSL Model: Surface Soil Cleanup Objectives for Contaminants Based Upon the Migration to Groundwater Exposure Route

Compound/Analyte: Benzene

Equation S17

$$Re\,mediationObjective = C_w * \left[K_d + \frac{\theta_w + \theta_a * H^{'}}{\rho_b} \right] \quad = 1.19$$

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
C_w	See equation S18 below	mg/L	0.5
K_d	See equation S19 below	L/kg	2.23820
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.15
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.28
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.5
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.228

Equation S18

$$C_w = DF * GW_{obj} \quad = 0.5$$
Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
DF	Default Value of 20 or Equation S22	unitless	20
GW_{obj}	TACO Appendix B Table E or Equation S23	mg/L	0.025

Equation S19

$$K_d = K_{oc} * f_{oc} \quad = 2.23820$$
Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
K_{oc}	Chemical Specific TACO Appendix C Table E	cm^3/g	58.9
f_{oc} (Organic Carbon Content)	Field measurement or TACO Appendix C Table B	g/g	0.038

The calculated Remediation Objective must now be compared to the C_{sat} value, the most restrict value will be the Tier 2 screening level.

Equation S29

$$C_{sat} = \frac{S}{\rho_b} * \left[\left(K_d * \rho_b \right) + \theta_w + \left(H ' * \theta_a \right) \right]$$

= 4166.3   (Calculated Value)

870   (TACO Value)

Where

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
S	Chemical Specific TACO Appendix C Table E	mg/L	1,750
K_d	See equation S19 above	L/kg	2.23820
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.15
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.28
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.5
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.228

Results:

Chemical Name	Remediation Objective	C_{sat}	Tier 2 Screening Level
Benzene	1.19	870.0	1.19

TACO SSL Model: Surface Soil Cleanup Objectives for Contaminants Based Upon the Migration to Groundwater Exposure Route

Compound/Analyte: Benzene

Equation S17

$$Re\,mediationObjective = C_w * \left[K_d + \frac{\theta_w + \theta_a * H'}{\rho_b} \right]$$ = 1.17

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
C_w	See equation S18 below	mg/L	0.5
K_d	See equation S19 below	L/kg	2.23820
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.2
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.05
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	2
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.228

Equation S18

$C_w = DF * GW_{obj}$ = 0.5

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
DF	Default Value of 20 or Equation S22	unitless	20
GW_{obj}	TACO Appendix B Table E or Equation S23	mg/L	0.025

Equation S19

$K_d = K_{oc} * f_{oc}$ = 2.23820

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
K_{oc}	Chemical Specific TACO Appendix C Table E	cm^3/g	58.9
f_{oc} (Organic Carbon Content)	Field measurement or TACO Appendix C Table B	g/g	0.038

The calculated Remediation Objective must now be compared to the C_{sat} value, the most restrict value will be the Tier 2 screening level.

Equation S29

$$C_{sat} = \frac{S}{\rho_b} * [(K_d * \rho_b) + \theta_w + (H' * \theta_a)]$$

= 4101.8   (Calculated Value)
870   (TACO Value)

Where

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
S	Chemical Specific TACO Appendix C Table E	mg/L	1,750
K_d	See equation S19 above	L/kg	2.23820
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.2
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.05
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	2
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.228

Results:

Chemical Name	Remediation Objective	C_{sat}	Tier 2 Screening Level
Benzene	1.17	870.0	1.17

TACO SSL Model: Subsurface Soil Cleanup Objectives for Contaminants Based Upon the Migration to Groundwater Exposure Route

Compound/Analyte: Benzene

Equation S17

$$\text{Re}\,mediationObjective = C_w * \left[K_d + \frac{\theta_w + \theta_a * H'}{\rho_b} \right]$$ = 0.235

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
C_w	See equation S18 below	mg/L	0.5
K_d	See equation S19 below	L/kg	0.33573
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.16
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.24
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.6
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.228

Equation S18

$$C_w = DF * GW_{obj}$$ = 0.5

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
DF	Default Value of 20 or Equation S22	unitless	20
GW_{obj}	TACO Appendix B Table E or Equation S23	mg/L	0.025

Equation S19

$$K_d = K_{oc} * f_{oc}$$ = 0.33573

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
K_{oc}	Chemical Specific TACO Appendix C Table E	cm^3/g	58.9
f_{oc} (Organic Carbon Content)	Field measurement or TACO Appendix C Table B	g/g	0.0057

The calculated Remediation Objective must now be compared to the C_{sat} value, the most restrict value will be the Tier 2 screening level.

Equation S29

$$C_{sat} = \frac{S}{\rho_b} * \left[\left(K_d * \rho_b\right) + \theta_w + \left(H' * \theta_a\right)\right]$$

= 822.4   (Calculated Value)
870   (TACO Value)

Where

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
S	Chemical Specific TACO Appendix C Table E	mg/L	1,750
K_d	See equation S19 above	L/kg	0.33573
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.16
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.24
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.6
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.228

Results:

Chemical Name	Remediation Objective	C_{sat}	Tier 2 Screening Level
Benzene	0.235	822.4	0.235

TACO SSL Model: Subsurface Soil Cleanup Objectives for Contaminants Based Upon the Migration to Groundwater Exposure Route

Compound/Analyte: Benzene

Equation S17

$$\mathrm{Re}\,mediationObjective = C_w * \left[K_d + \frac{\theta_w + \theta_a * H^{'}}{\rho_b} \right]$$ = 0.231

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
C_w	See equation S18 below	mg/L	0.5
K_d	See equation S19 below	L/kg	0.33573
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.17
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.19
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.7
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.228

Equation S18

$$C_w = DF * GW_{obj}$$ = 0.5

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
DF	Default Value of 20 or Equation S22	unitless	20
GW_{obj}	TACO Appendix B Table E or Equation S23	mg/L	0.025

Equation S19

$$K_d = K_{oc} * f_{oc}$$ = 0.33573

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
K_{oc}	Chemical Specific TACO Appendix C Table E	cm^3/g	58.9
f_{oc} (Organic Carbon Content)	Field measurement or TACO Appendix C Table B	g/g	0.0057

The calculated Remediation Objective must now be compared to the C_{sat} value, the most restrict value will be the Tier 2 screening level.

Equation S29

$$C_{sat} = \frac{S}{\rho_b} * \left[(K_d * \rho_b) + \theta_w + (H' * \theta_a) \right]$$

= 807.1   (Calculated Value)

870   (TACO Value)

Where

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
S	Chemical Specific TACO Appendix C Table E	mg/L	1,750
K_d	See equation S19 above	L/kg	0.33573
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.17
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.19
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.7
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.228

Results:

Chemical Name	Remediation Objective	C_{sat}	Tier 2 Screening Level
Benzene	0.231	807.1	0.231

TACO SSL Model: Surface Soil Cleanup Objectives for Contaminants Based Upon the Migration to Groundwater Exposure Route

Compound/Analyte: Benzo(a)anthracene

Equation S17

$$Re\,mediationObjective = C_w * \left[K_d + \frac{\theta_w + \theta_a * H^{'}}{\rho_b} \right]$$
= 196.61

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
C_w	See equation S18 below	mg/L	0.013
K_d	See equation S19 below	L/kg	15124.00000
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.15
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.28
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.5
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.000137

Equation S18

$$C_w = DF * GW_{obj}$$ = 0.013

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
DF	Default Value of 20 or Equation S22	unitless	20
GW_{obj}	TACO Appendix B Table E or Equation S23	mg/L	0.00065

Equation S19

$$K_d = K_{oc} * f_{oc}$$ = 15124.00000

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
K_{oc}	Chemical Specific TACO Appendix C Table E	cm^3/g	398000
f_{oc} (Organic Carbon Content)	Field measurement or TACO Appendix C Table B	g/g	0.038

The calculated Remediation Objective must now be compared to the C_{sat} value, the most restrict value will be the Tier 2 screening level.

Equation S29

$$C_{sat} = \frac{S}{\rho_b} * [(K_d * \rho_b) + \theta_w + (H' * \theta_a)]$$

= 142.2   (Calculated Value)

NA   (TACO Value)

Where

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
S	Chemical Specific TACO Appendix C Table E	mg/L	0.0094
K_d	See equation S19 above	L/kg	15124.00
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.15
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.28
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.5
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.000137

Results:

Chemical Name	Remediation Objective	C_{sat}	Tier 2 Screening Level
Benzo(a)anthracene	196.61	142.2	142.2

TACO SSL Model: Surface Soil Cleanup Objectives for Contaminants Based Upon the Migration to Groundwater Exposure Route

Compound/Analyte: Benzo(a)anthracene

Equation S17

$$\mathrm{Re}\,mediationObjective = C_w * \left[K_d + \frac{\theta_w + \theta_a * H^{'}}{\rho_b} \right]$$ = 196.61

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
C_w	See equation S18 below	mg/L	0.013
K_d	See equation S19 below	L/kg	15124.00000
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.2
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.05
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	2
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.000137

Equation S18

$$C_w = DF * GW_{obj}$$ = 0.013

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
DF	Default Value of 20 or Equation S22	unitless	20
GW_{obj}	TACO Appendix B Table E or Equation S23	mg/L	0.00065

Equation S19

$$K_d = K_{oc} * f_{oc}$$ = 15124.00000

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
K_{oc}	Chemical Specific TACO Appendix C Table E	cm^3/g	398000
f_{oc} (Organic Carbon Content)	Field measurement or TACO Appendix C Table B	g/g	0.038

The calculated Remediation Objective must now be compared to the C_{sat} value, the most restrict value will be the Tier 2 screening level.

Equation S29

$$C_{sat} = \frac{S}{\rho_b} * \left[\left(K_d * \rho_b\right) + \theta_w + \left(H'*\theta_a\right)\right]$$

= 142.2   (Calculated Value)

NA   (TACO Value)

Where

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
S	Chemical Specific TACO Appendix C Table E	mg/L	0.0094
K_d	See equation S19 above	L/kg	15124.00000
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.2
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.05
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	2
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.000137

Results:

Chemical Name	Remediation Objective	C_{sat}	Tier 2 Screening Level
Benzo(a)anthracene	196.61	142.2	142.2

TACO SSL Model: Subsurface Soil Cleanup Objectives for Contaminants Based Upon the Migration to Groundwater Exposure Route

Compound/Analyte: Benzo(a)anthracene

Equation S17

$$\mathrm{Re}\,mediationObjective = C_w * \left[K_d + \frac{\theta_w + \theta_a * H'}{\rho_b} \right]$$ = 29.493

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
C_w	See equation S18 below	mg/L	0.013
K_d	See equation S19 below	L/kg	2268.6
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.16
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.24
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.6
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.000137

Equation S18

$$C_w = DF * GW_{obj}$$ = 0.013

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
DF	Default Value of 20 or Equation S22	unitless	20
GW_{obj}	TACO Appendix B Table E or Equation S23	mg/L	0.00065

Equation S19

$$K_d = K_{oc} * f_{oc}$$ = 2268.6

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
K_{oc}	Chemical Specific TACO Appendix C Table E	cm^3/g	398000
f_{oc} (Organic Carbon Content)	Field measurement or TACO Appendix C Table B	g/g	0.0057

The calculated Remediation Objective must now be compared to the C_{sat} value, the most restrict value will be the Tier 2 screening level.

Equation S29

$$C_{sat} = \frac{S}{\rho_b} * \left[\left(K_d * \rho_b \right) + \theta_w + \left(H'*\theta_a \right) \right]$$

= 21.3   (Calculated Value)
NA   (TACO Value)

Where

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
S	Chemical Specific TACO Appendix C Table E	mg/L	0.0094
K_d	See equation S19 above	L/kg	2268.6
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.16
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.24
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.6
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.000137

Results:

Chemical Name	Remediation Objective	C_{sat}	Tier 2 Screening Level
Benzo(a)anthracene	29.493	21.3	21.3

TACO SSL Model: Subsurface Soil Cleanup Objectives for Contaminants Based Upon the Migration to Groundwater Exposure Route

Compound/Analyte: Benzo(a)anthracene

Equation S17

$$Re\,mediation\,Objective = C_w * \left[K_d + \frac{\theta_w + \theta_a * H^{'}}{\rho_b} \right] = 29.493$$

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
C_w	See equation S18 below	mg/L	0.013
K_d	See equation S19 below	L/kg	2268.6
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.17
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.19
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.7
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.000137

Equation S18

$$C_w = DF * GW_{obj} = 0.013$$
Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
DF	Default Value of 20 or Equation S22	unitless	20
GW_{obj}	TACO Appendix B Table E or Equation S23	mg/L	0.00065

Equation S19

$$K_d = K_{oc} * f_{oc} = 2268.6$$
Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
K_{oc}	Chemical Specific TACO Appendix C Table E	cm^3/g	398000
f_{oc} (Organic Carbon Content)	Field measurement or TACO Appendix C Table B	g/g	0.0057

The calculated Remediation Objective must now be compared to the C_{sat} value, the most restrict value will be the Tier 2 screening level.

Equation S29

$$C_{sat} = \frac{S}{\rho_b} * [(K_d * \rho_b) + \theta_w + (H' * \theta_a)]$$

= 21.3   (Calculated Value)

NA   (TACO Value)

Where

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
S	Chemical Specific TACO Appendix C Table E	mg/L	0.0094
K_d	See equation S19 above	L/kg	2268.6
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.17
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.19
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.7
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.000137

Results:

Chemical Name	Remediation Objective	C_{sat}	Tier 2 Screening Level
Benzo(a)anthracene	29.493	21.3	21.3

TACO SSL Model: Surface Soil Cleanup Objectives for Contaminants Based Upon the Migration to Groundwater Exposure Route

Compound/Analyte: Carbazole

Equation S17

$$\text{Re} \, mediation \, Objective = C_w * \left[K_d + \frac{\theta_w + \theta_a * H'}{\rho_b} \right] \quad = 51.568$$

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
C_w	See equation S18 below	mg/L	0.4
K_d	See equation S19 below	L/kg	128.82
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.15
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.28
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.5
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.000000626

Equation S18

$$C_w = DF * GW_{obj} \quad = 0.4$$
Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
DF	Default Value of 20 or Equation S22	unitless	20
GW_{obj}	TACO Appendix B Table E or Equation S23	mg/L	0.02

Equation S19

$$K_d = K_{oc} * f_{oc} \quad = 128.82$$
Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
K_{oc}	Chemical Specific TACO Appendix C Table E	cm^3/g	3390
f_{oc} (Organic Carbon Content)	Field measurement or TACO Appendix C Table B	g/g	0.038

The calculated Remediation Objective must now be compared to the C_{sat} value, the most restrict value will be the Tier 2 screening level.

Equation S29

$$C_{sat} = \frac{S}{\rho_b} * \left[\left(K_d * \rho_b \right) + \theta_w + \left(H' * \theta_a \right) \right]$$

= 964.3   (Calculated Value)

NA   (TACO Value)

Where

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
S	Chemical Specific TACO Appendix C Table E	mg/L	7.48
K_d	See equation S19 above	L/kg	128.82
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.15
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.28
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.5
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.000000626

Results:

Chemical Name	Remediation Objective	C_{sat}	Tier 2 Screening Level
Carbazole	51.568	964.3	51.568

TACO SSL Model: Surface Soil Cleanup Objectives for Contaminants Based Upon the Migration to Groundwater Exposure Route

Compound/Analyte: Carbazole

Equation S17

$$\text{Re}\,mediationObjective = C_w * \left[K_d + \frac{\theta_w + \theta_a * H'}{\rho_b} \right]$$ = 51.568

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
C_w	See equation S18 below	mg/L	0.4
K_d	See equation S19 below	L/kg	128.82
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.2
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.05
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	2
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.000000626

Equation S18

$$C_w = DF * GW_{obj}$$ = 0.4

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
DF	Default Value of 20 or Equation S22	unitless	20
GW_{obj}	TACO Appendix B Table E or Equation S23	mg/L	0.02

Equation S19

$$K_d = K_{oc} * f_{oc}$$ = 128.82

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
K_{oc}	Chemical Specific TACO Appendix C Table E	cm^3/g	3390
f_{oc} (Organic Carbon Content)	Field measurement or TACO Appendix C Table B	g/g	0.038

The calculated Remediation Objective must now be compared to the C_{sat} value, the most restrict value will be the Tier 2 screening level.

Equation S29

$$C_{sat} = \frac{S}{\rho_b} * \left[(K_d * \rho_b) + \theta_w + (H' * \theta_a) \right]$$

= 964.3   (Calculated Value)

NA   (TACO Value)

Where

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
S	Chemical Specific TACO Appendix C Table E	mg/L	7.48
K_d	See equation S19 above	L/kg	128.82
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.2
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.05
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	2
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.000000626

Results:

Chemical Name	Remediation Objective	C_{sat}	Tier 2 Screening Level
Carbazole	51.568	964.3	51.568

TACO SSL Model: Subsurface Soil Cleanup Objectives for Contaminants Based Upon the Migration to Groundwater Exposure Route

Compound/Analyte: Carbazole

Equation S17

$$\mathrm{Re}\,mediationObjective = C_w * \left[K_d + \frac{\theta_w + \theta_a * H^{'}}{\rho_b} \right]$$ = 7.769

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
C_w	See equation S18 below	mg/L	0.4
K_d	See equation S19 below	L/kg	19.323
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.16
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.24
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.6
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.000000626

Equation S18

$$C_w = DF * GW_{obj}$$ = 0.4

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
DF	Default Value of 20 or Equation S22	unitless	20
GW_{obj}	TACO Appendix B Table E or Equation S23	mg/L	0.02

Equation S19

$$K_d = K_{oc} * f_{oc}$$ = 19.323

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
K_{oc}	Chemical Specific TACO Appendix C Table E	cm^3/g	3390
f_{oc} (Organic Carbon Content)	Field measurement or TACO Appendix C Table B	g/g	0.0057

The calculated Remediation Objective must now be compared to the C_{sat} value, the most restrict value will be the Tier 2 screening level.

Equation S29

$$C_{sat} = \frac{S}{\rho_b} * [(K_d * \rho_b) + \theta_w + (H' * \theta_a)]$$

= 145.3   (Calculated Value)
NA   (TACO Value)

Where

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
S	Chemical Specific TACO Appendix C Table E	mg/L	7.48
K_d	See equation S19 above	L/kg	19.323
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.16
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.24
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.6
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.000000626

Results:

Chemical Name	Remediation Objective	C_{sat}	Tier 2 Screening Level
Carbazole	7.769	145.3	7.769

TACO SSL Model: Subsurface Soil Cleanup Objectives for Contaminants Based Upon the Migration to Groundwater Exposure Route

Compound/Analyte: Carbazole

Equation S17

$$\mathrm{Re}\,mediation Objective = C_w * \left[K_d + \frac{\theta_w + \theta_a * H^{'}}{\rho_b} \right]$$ = 7.769

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
C_w	See equation S18 below	mg/L	0.4
K_d	See equation S19 below	L/kg	19.323
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.17
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.19
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.7
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.000000626

Equation S18

$C_w = DF * GW_{obj}$ = 0.4

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
DF	Default Value of 20 or Equation S22	unitless	20
GW$_{obj}$	TACO Appendix B Table E or Equation S23	mg/L	0.02

Equation S19

$K_d = K_{oc} * f_{oc}$ = 19.323

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
K_{oc}	Chemical Specific TACO Appendix C Table E	cm^3/g	3390
f_{oc} (Organic Carbon Content)	Field measurement or TACO Appendix C Table B	g/g	0.0057

The calculated Remediation Objective must now be compared to the C_{sat} value, the most restrict value will be the Tier 2 screening level.

Equation S29

$$C_{sat} = \frac{S}{\rho_b} * \left[(K_d * \rho_b) + \theta_w + (H' * \theta_a) \right]$$

= 145.3   (Calculated Value)

NA   (TACO Value)

Where

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
S	Chemical Specific TACO Appendix C Table E	mg/L	7.48
K_d	See equation S19 above	L/kg	19.323
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.17
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.19
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.7
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.000000626

Results:

Chemical Name	Remediation Objective	C_{sat}	Tier 2 Screening Level
Carbazole	7.769	145.3	7.769

TACO SSL Model: Surface Soil Cleanup Objectives for Contaminants Based Upon the Migration to Groundwater Exposure Route

Compound/Analyte: Dibenzo(a,h)anthracene

Equation S17

$$\mathrm{Re}\,mediationObjective = C_w * \left[K_d + \frac{\theta_w + \theta_a * H^{'}}{\rho_b} \right]$$ = 4332.00

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
C_w	See equation S18 below	mg/L	0.03
K_d	See equation S19 below	L/kg	144400.00
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.15
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.28
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.5
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.000000603

Equation S18

$$C_w = DF * GW_{obj}$$ = 0.03

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
DF	Default Value of 20 or Equation S22	unitless	20
GW_{obj}	TACO Appendix B Table E or Equation S23	mg/L	0.0015

Equation S19

$$K_d = K_{oc} * f_{oc}$$ = 144400.00000

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
K_{oc}	Chemical Specific TACO Appendix C Table E	cm^3/g	3800000
f_{oc} (Organic Carbon Content)	Field measurement or TACO Appendix C Table B	g/g	0.038

The calculated Remediation Objective must now be compared to the C_{sat} value, the most restrict value will be the Tier 2 screening level.

Equation S29

$$C_{sat} = \frac{S}{\rho_b} * \left[\left(K_d * \rho_b\right) + \theta_w + \left(H'*\theta_a\right)\right]$$

    = 359.6   (Calculated Value)

    NA   (TACO Value)

Where

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
S	Chemical Specific TACO Appendix C Table E	mg/L	0.00249
K_d	See equation S19 above	L/kg	144400.00
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.15
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.28
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.5
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.000000603

Results:

Chemical Name	Remediation Objective	C_{sat}	Tier 2 Screening Level
Dibenzo(a,h)anthracene	4332.00	359.6	359.6

TACO SSL Model: Surface Soil Cleanup Objectives for Contaminants Based Upon the Migration to Groundwater Exposure Route

Compound/Analyte: Ethylbenzene

Equation S17

$$Re\,mediationObjective = C_w * \left[K_d + \frac{\theta_w + \theta_a * H'}{\rho_b} \right] = 279.0859$$

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
C_w	See equation S18 below	mg/L	20
K_d	See equation S19 below	L/kg	13.794
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.15
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.28
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.5
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.323

Equation S18

$$C_w = DF * GW_{obj} = 20$$

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
DF	Default Value of 20 or Equation S22	unitless	20
GW_{obj}	TACO Appendix B Table E or Equation S23	mg/L	1

Equation S19

$$K_d = K_{oc} * f_{oc} = 13.794$$

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
K_{oc}	Chemical Specific TACO Appendix C Table E	cm^3/g	363
f_{oc} (Organic Carbon Content)	Field measurement or TACO Appendix C Table B	g/g	0.038

The calculated Remediation Objective must now be compared to the C_{sat} value, the most restrict value will be the Tier 2 screening level.

Equation S29

$$C_{sat} = \frac{S}{\rho_b} * \left[(K_d * \rho_b) + \theta_w + (H' * \theta_a) \right]$$

= 2358.3   (Calculated Value)
400   (TACO Value)

Where

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
S	Chemical Specific TACO Appendix C Table E	mg/L	169
K_d	See equation S19 above	L/kg	13.794
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.15
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.28
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.5
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.323

Results:

Chemical Name	Remediation Objective	C_{sat}	Tier 2 Screening Level
Ethylbenzene	279.0859	400.0	279.0859

TACO SSL Model: Surface Soil Cleanup Objectives for Contaminants Based Upon the Migration to Groundwater Exposure Route

Compound/Analyte: Ethylbenzene

Equation S17

$$Re\,mediationObjective = C_w * \left[K_d + \frac{\theta_w + \theta_a * H'}{\rho_b} \right] = 278.0415$$

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
C_w	See equation S18 below	mg/L	20
K_d	See equation S19 below	L/kg	13.794
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.2
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.05
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	2
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.323

Equation S18

$$C_w = DF * GW_{obj} = 20$$
Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
DF	Default Value of 20 or Equation S22	unitless	20
GW$_{obj}$	TACO Appendix B Table E or Equation S23	mg/L	1

Equation S19

$$K_d = K_{oc} * f_{oc} = 13.794$$
Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
K_{oc}	Chemical Specific TACO Appendix C Table E	cm^3/g	363
f_{oc} (Organic Carbon Content)	Field measurement or TACO Appendix C Table B	g/g	0.038

The calculated Remediation Objective must now be compared to the C_{sat} value, the most restrict value will be the Tier 2 screening level.

Equation S29

$$C_{sat} = \frac{S}{\rho_b} * \left[(K_d * \rho_b) + \theta_w + (H' * \theta_a) \right]$$

= 2349.5   (Calculated Value)

400   (TACO Value)

Where

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
S	Chemical Specific TACO Appendix C Table E	mg/L	169
K_d	See equation S19 above	L/kg	13.794
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.2
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.05
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	2
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.323

Results:

Chemical Name	Remediation Objective	C_{sat}	Tier 2 Screening Level
Ethylbenzene	278.0415	400.0	278.0415

TACO SSL Model: Subsurface Soil Cleanup Objectives for Contaminants Based Upon the Migration to Groundwater Exposure Route

Compound/Analyte: Ethylbenzene

Equation S17

$$\mathrm{Re}\,mediation\,Objective = C_w * \left[K_d + \frac{\theta_w + \theta_a * H'}{\rho_b} \right]$$ = 44.351

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
C_w	See equation S18 below	mg/L	20
K_d	See equation S19 below	L/kg	2.0691
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.16
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.24
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.6
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.323

Equation S18

$C_w = DF * GW_{obj}$ = 20

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
DF	Default Value of 20 or Equation S22	unitless	20
GW_{obj}	TACO Appendix B Table E or Equation S23	mg/L	1

Equation S19

$K_d = K_{oc} * f_{oc}$ = 2.0691

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
K_{oc}	Chemical Specific TACO Appendix C Table E	cm^3/g	363
f_{oc} (Organic Carbon Content)	Field measurement or TACO Appendix C Table B	g/g	0.0057

The calculated Remediation Objective must now be compared to the C_{sat} value, the most restrict value will be the Tier 2 screening level.

Equation S29

$$C_{sat} = \frac{S}{\rho_b} * \left[(K_d * \rho_b) + \theta_w + (H' * \theta_a) \right]$$

= 374.8   (Calculated Value)

400   (TACO Value)

Where

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
S	Chemical Specific TACO Appendix C Table E	mg/L	169
K_d	See equation S19 above	L/kg	2.0691
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.16
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.24
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.6
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.323

Results:

Chemical Name	Remediation Objective	C_{sat}	Tier 2 Screening Level
Ethylbenzene	44.351	374.8	44.351

TACO SSL Model: Subsurface Soil Cleanup Objectives for Contaminants Based Upon the Migration to Groundwater Exposure Route

Compound/Analyte: Ethylbenzene

Equation S17

$$\text{Re}\,mediationObjective = C_w * \left[K_d + \frac{\theta_w + \theta_a * H'}{\rho_b} \right] = 44.104$$

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
C_w	See equation S18 below	mg/L	20
K_d	See equation S19 below	L/kg	2.0691
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.17
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.19
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.7
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.323

Equation S18

$$C_w = DF * GW_{obj} = 20$$

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
DF	Default Value of 20 or Equation S22	unitless	20
GW_{obj}	TACO Appendix B Table E or Equation S23	mg/L	1

Equation S19

$$K_d = K_{oc} * f_{oc} = 2.0691$$

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
K_{oc}	Chemical Specific TACO Appendix C Table E	cm^3/g	363
f_{oc} (Organic Carbon Content)	Field measurement or TACO Appendix C Table B	g/g	0.0057

The calculated Remediation Objective must now be compared to the C_{sat} value, the most restrict value will be the Tier 2 screening level.

Equation S29

$$C_{sat} = \frac{S}{\rho_b} * [(K_d * \rho_b) + \theta_w + (H' * \theta_a)]$$

= 372.7   (Calculated Value)
400   (TACO Value)

Where

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
S	Chemical Specific TACO Appendix C Table E	mg/L	169
K_d	See equation S19 above	L/kg	2.0691
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.17
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.19
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.7
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.323

Results:

Chemical Name	Remediation Objective	C_{sat}	Tier 2 Screening Level
Ethylbenzene	44.104	372.7	44.104

TACO SSL Model: Surface Soil Cleanup Objectives for Contaminants Based Upon the Migration to Groundwater Exposure Route

Compound/Analyte: Naphthalene

Equation S17

$$\mathrm{Re}\,mediation\,Objective = C_w * \left[K_d + \frac{\theta_w + \theta_a * H^{'}}{\rho_b} \right]$$ = 334.86

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
C_w	See equation S18 below	mg/L	4.4
K_d	See equation S19 below	L/kg	76.00
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.15
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.28
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.5
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.0198

Equation S18

$C_w = DF * GW_{obj}$ = 4.4

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
DF	Default Value of 20 or Equation S22	unitless	20
GW_{obj}	TACO Appendix B Table E or Equation S23	mg/L	0.22

Equation S19

$K_d = K_{oc} * f_{oc}$ = 76.00

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
K_{oc}	Chemical Specific TACO Appendix C Table E	cm^3/g	2000
f_{oc} (Organic Carbon Content)	Field measurement or TACO Appendix C Table B	g/g	0.038

The calculated Remediation Objective must now be compared to the C_{sat} value, the most restrict value will be the Tier 2 screening level.

Equation S29

$$C_{sat} = \frac{S}{\rho_b} * \left[\left(K_d * \rho_b \right) + \theta_w + \left(H' * \theta_a \right) \right]$$

= 2359.2   (Calculated Value)

NA   (TACO Value)

Where

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
S	Chemical Specific TACO Appendix C Table E	mg/L	31.00
K_d	See equation S19 above	L/kg	76.00
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.15
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.28
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.5
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.0198

Results:

Chemical Name	Remediation Objective	C_{sat}	Tier 2 Screening Level
Naphthalene	334.86	2359.2	334.86

TACO SSL Model: Surface Soil Cleanup Objectives for Contaminants Based Upon the Migration to Groundwater Exposure Route

Compound/Analyte: Naphthalene

Equation S17

$$Re\,mediationObjective = C_w * \left[K_d + \frac{\theta_w + \theta_a * H^{'}}{\rho_b} \right]$$ = 334.84

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
C_w	See equation S18 below	mg/L	4.4
K_d	See equation S19 below	L/kg	76.00000
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.2
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.05
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	2
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.0198

Equation S18

$C_w = DF * GW_{obj}$ = 4.4
Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
DF	Default Value of 20 or Equation S22	unitless	20
GW_{obj}	TACO Appendix B Table E or Equation S23	mg/L	0.22

Equation S19

$K_d = K_{oc} * f_{oc}$ = 76.00
Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
K_{oc}	Chemical Specific TACO Appendix C Table E	cm^3/g	2000
f_{oc} (Organic Carbon Content)	Field measurement or TACO Appendix C Table B	g/g	0.038

The calculated Remediation Objective must now be compared to the C_{sat} value, the most restrict value will be the Tier 2 screening level.

Equation S29

$$C_{sat} = \frac{S}{\rho_b} * \left[\left(K_d * \rho_b \right) + \theta_w + \left(H' * \theta_a \right) \right]$$

= 2359.1   (Calculated Value)

NA   (TACO Value)

Where

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
S	Chemical Specific TACO Appendix C Table E	mg/L	31.00
K_d	See equation S19 above	L/kg	76.00000
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.2
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.05
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	2
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.0198

Results:

Chemical Name	Remediation Objective	C_{sat}	Tier 2 Screening Level
Naphthalene	334.84	2359.1	334.84

TACO SSL Model: Subsurface Soil Cleanup Objectives for Contaminants Based Upon the Migration to Groundwater Exposure Route

Compound/Analyte: Naphthalene

Equation S17

$$Re\,mediation\,Objective = C_w * \left[K_d + \frac{\theta_w + \theta_a * H'}{\rho_b} \right]$$ = 50.613

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
C_w	See equation S18 below	mg/L	4.4
K_d	See equation S19 below	L/kg	11.4
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.16
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.24
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.6
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.0198

Equation S18

$$C_w = DF * GW_{obj}$$ = 4.4

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
DF	Default Value of 20 or Equation S22	unitless	20
GW_{obj}	TACO Appendix B Table E or Equation S23	mg/L	0.22

Equation S19

$$K_d = K_{oc} * f_{oc}$$ = 11.40

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
K_{oc}	Chemical Specific TACO Appendix C Table E	cm^3/g	2000
f_{oc} (Organic Carbon Content)	Field measurement or TACO Appendix C Table B	g/g	0.0057

The calculated Remediation Objective must now be compared to the C_{sat} value, the most restrict value will be the Tier 2 screening level.

Equation S29

$$C_{sat} = \frac{S}{\rho_b} * \left[(K_d * \rho_b) + \theta_w + (H' * \theta_a) \right]$$

= 356.6   (Calculated Value)
NA   (TACO Value)

Where

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
S	Chemical Specific TACO Appendix C Table E	mg/L	31.00
K_d	See equation S19 above	L/kg	11.4
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.16
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.24
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.6
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.0198

Results:

Chemical Name	Remediation Objective	C_{sat}	Tier 2 Screening Level
Naphthalene	50.613	356.6	50.613

TACO SSL Model: Subsurface Soil Cleanup Objectives for Contaminants Based Upon the Migration to Groundwater Exposure Route

Compound/Analyte: Naphthalene

Equation S17

$$\mathrm{Re}\,mediationObjective = C_w * \left[K_d + \frac{\theta_w + \theta_a * H'}{\rho_b} \right]$$ = 50.610

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
C_w	See equation S18 below	mg/L	4.4
K_d	See equation S19 below	L/kg	11.4
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.17
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.19
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.7
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.0198

Equation S18

$$C_w = DF * GW_{obj}$$ = 4.4

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
DF	Default Value of 20 or Equation S22	unitless	20
GW_{obj}	TACO Appendix B Table E or Equation S23	mg/L	0.22

Equation S19

$$K_d = K_{oc} * f_{oc}$$ = 11.40

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
K_{oc}	Chemical Specific TACO Appendix C Table E	cm^3/g	2000
f_{oc} (Organic Carbon Content)	Field measurement or TACO Appendix C Table B	g/g	0.0057

The calculated Remediation Objective must now be compared to the C_{sat} value, the most restrict value will be the Tier 2 screening level.

Equation S29

$$C_{sat} = \frac{S}{\rho_b} * \left[(K_d * \rho_b) + \theta_w + (H' * \theta_a) \right]$$

$= 356.6$ (Calculated Value)

NA   (TACO Value)

Where

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
S	Chemical Specific TACO Appendix C Table E	mg/L	31.00
K_d	See equation S19 above	L/kg	11.4
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.17
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.19
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.7
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.0198

Results:

Chemical Name	Remediation Objective	C_{sat}	Tier 2 Screening Level
Naphthalene	50.610	356.6	50.610

TACO SSL Model: Surface Soil Cleanup Objectives for Contaminants Based Upon the Migration to Groundwater Exposure Route

Compound/Analyte: Tetrachloroethene

Equation S17

$$\mathrm{Re}\,mediationObjective = C_w * \left[K_d + \frac{\theta_w + \theta_a * H^{'}}{\rho_b} \right] \quad = 3.07$$

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
C_w	See equation S18 below	mg/L	0.5
K_d	See equation S19 below	L/kg	5.89000
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.15
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.28
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.5
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.754

Equation S18

$$C_w = DF * GW_{obj} \quad = 0.5$$
Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
DF	Default Value of 20 or Equation S22	unitless	20
GW_{obj}	TACO Appendix B Table E or Equation S23	mg/L	0.025

Equation S19

$$K_d = K_{oc} * f_{oc} \quad = 5.89000$$
Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
K_{oc}	Chemical Specific TACO Appendix C Table E	cm^3/g	155
f_{oc} (Organic Carbon Content)	Field measurement or TACO Appendix C Table B	g/g	0.038

The calculated Remediation Objective must now be compared to the C_{sat} value, the most restrict value will be the Tier 2 screening level.

Equation S29

$$C_{sat} = \frac{S}{\rho_b} * \left[\left(K_d * \rho_b\right) + \theta_w + \left(H' * \theta_a\right)\right]$$

= 1226.1 (Calculated Value)
240 (TACO Value)

Where

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
S	Chemical Specific TACO Appendix C Table E	mg/L	200
K_d	See equation S19 above	L/kg	5.89000
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.15
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.28
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.5
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.754

Results:

Chemical Name	Remediation Objective	C_{sat}	Tier 2 Screening Level
Tetrachloroethene	3.07	240.0	3.07

TACO SSL Model: Surface Soil Cleanup Objectives for Contaminants Based Upon the Migration to Groundwater Exposure Route

Compound/Analyte: Tetrachloroethene

Equation S17

$$Re\,mediationObjective = C_w * \left[K_d + \frac{\theta_w + \theta_a * H'}{\rho_b} \right]$$ = 3.00

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
C_w	See equation S18 below	mg/L	0.5
K_d	See equation S19 below	L/kg	5.89000
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.2
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.05
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	2
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.754

Equation S18

$C_w = DF * GW_{obj}$ = 0.5

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
DF	Default Value of 20 or Equation S22	unitless	20
GW_{obj}	TACO Appendix B Table E or Equation S23	mg/L	0.025

Equation S19

$K_d = K_{oc} * f_{oc}$ = 5.89000

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
K_{oc}	Chemical Specific TACO Appendix C Table E	cm^3/g	155
f_{oc} (Organic Carbon Content)	Field measurement or TACO Appendix C Table B	g/g	0.038

The calculated Remediation Objective must now be compared to the C_{sat} value, the most restrict value will be the Tier 2 screening level.

Equation S29

$$C_{sat} = \frac{S}{\rho_b} * \left[\left(K_d * \rho_b\right) + \theta_w + \left(H' * \theta_a\right)\right]$$

= 1201.8   (Calculated Value)

240   (TACO Value)

Where

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
S	Chemical Specific TACO Appendix C Table E	mg/L	200
K_d	See equation S19 above	L/kg	5.89000
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.2
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.05
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	2
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.754

Results:

Chemical Name	Remediation Objective	C_{sat}	Tier 2 Screening Level
Tetrachloroethene	3.00	240.0	3.00

TACO SSL Model: Subsurface Soil Cleanup Objectives for Contaminants Based Upon the Migration to Groundwater Exposure Route

Compound/Analyte: Tetrachloroethene

Equation S17

$$\text{Re}\,mediationObjective = C_w * \left[K_d + \frac{\theta_w + \theta_a * H'}{\rho_b} \right]$$ = 0.548

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
C_w	See equation S18 below	mg/L	0.5
K_d	See equation S19 below	L/kg	0.8835
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.16
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.24
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.6
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.754

Equation S18

$$C_w = DF * GW_{obj}$$ = 0.5

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
DF	Default Value of 20 or Equation S22	unitless	20
GW_{obj}	TACO Appendix B Table E or Equation S23	mg/L	0.025

Equation S19

$$K_d = K_{oc} * f_{oc}$$ = 0.8835

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
K_{oc}	Chemical Specific TACO Appendix C Table E	cm^3/g	155
f_{oc} (Organic Carbon Content)	Field measurement or TACO Appendix C Table B	g/g	0.0057

The calculated Remediation Objective must now be compared to the C_{sat} value, the most restrict value will be the Tier 2 screening level.

Equation S29

$$C_{sat} = \frac{S}{\rho_b} * \left[(K_d * \rho_b) + \theta_w + (H'*\theta_a) \right]$$

= 219.3   (Calculated Value)

240   (TACO Value)

Where

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
S	Chemical Specific TACO Appendix C Table E	mg/L	200
K_d	See equation S19 above	L/kg	0.8835
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.16
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.24
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.6
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.754

Results:

Chemical Name	Remediation Objective	C_{sat}	Tier 2 Screening Level
Tetrachloroethene	0.548	219.3	0.548

TACO SSL Model: Subsurface Soil Cleanup Objectives for Contaminants Based Upon the Migration to Groundwater Exposure Route

Compound/Analyte: Tetrachloroethene

Equation S17

$$\mathrm{Re}\,mediationObjective = C_w * \left[K_d + \frac{\theta_w + \theta_a * H'}{\rho_b} \right]$$ = 0.534

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
C_w	See equation S18 below	mg/L	0.5
K_d	See equation S19 below	L/kg	0.8835
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.17
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.19
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.7
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.754

Equation S18

$$C_w = DF * GW_{obj}$$ = 0.5

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
DF	Default Value of 20 or Equation S22	unitless	20
GW_{obj}	TACO Appendix B Table E or Equation S23	mg/L	0.025

Equation S19

$$K_d = K_{oc} * f_{oc}$$ = 0.8835

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
K_{oc}	Chemical Specific TACO Appendix C Table E	cm^3/g	155
f_{oc} (Organic Carbon Content)	Field measurement or TACO Appendix C Table B	g/g	0.0057

The calculated Remediation Objective must now be compared to the C_{sat} value, the most restrict value will be the Tier 2 screening level.

Equation S29

$$C_{sat} = \frac{S}{\rho_b} * \left[(K_d * \rho_b) + \theta_w + (H' * \theta_a) \right]$$

= 213.6   (Calculated Value)
240   (TACO Value)

Where

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
S	Chemical Specific TACO Appendix C Table E	mg/L	200
K_d	See equation S19 above	L/kg	0.8835
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.17
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.19
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.7
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.754

Results:

Chemical Name	Remediation Objective	C_{sat}	Tier 2 Screening Level
Tetrachloroethene	0.534	213.6	0.534

TACO SSL Model: Surface Soil Cleanup Objectives for Contaminants Based Upon the Migration to Groundwater Exposure Route

Compound/Analyte: Toluene

Equation S17

$$Re\,mediationObjective = C_w * \left[K_d + \frac{\theta_w + \theta_a * H^{'}}{\rho_b} \right] = 353.339$$

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
C_w	See equation S18 below	mg/L	50
K_d	See equation S19 below	L/kg	6.916
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.15
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.28
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.5
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.272

Equation S18

$$C_w = DF * GW_{obj} = 50$$
Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
DF	Default Value of 20 or Equation S22	unitless	20
GW_{obj}	TACO Appendix B Table E or Equation S23	mg/L	2.5

Equation S19

$$K_d = K_{oc} * f_{oc} = 6.916$$
Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
K_{oc}	Chemical Specific TACO Appendix C Table E	cm^3/g	182
f_{oc} (Organic Carbon Content)	Field measurement or TACO Appendix C Table B	g/g	0.038

The calculated Remediation Objective must now be compared to the C_{sat} value, the most restrict value will be the Tier 2 screening level.

Equation S29

$$C_{sat} = \frac{S}{\rho_b} * \left[(K_d * \rho_b) + \theta_w + (H' * \theta_a) \right]$$

= 3717.1   (Calculated Value)

650   (TACO Value)

Where

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
S	Chemical Specific TACO Appendix C Table E	mg/L	526
K_d	See equation S19 above	L/kg	6.916
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.15
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.28
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.5
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.272

Results:

Chemical Name	Remediation Objective	C_{sat}	Tier 2 Screening Level
Toluene	353.339	650.0	353.339

TACO SSL Model: Surface Soil Cleanup Objectives for Contaminants Based Upon the Migration to Groundwater Exposure Route

Compound/Analyte: Toluene

Equation S17

$$\mathrm{Re}\,mediationObjective = C_w * \left[K_d + \frac{\theta_w + \theta_a * H'}{\rho_b} \right] = 351.140$$

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
C_w	See equation S18 below	mg/L	50
K_d	See equation S19 below	L/kg	6.916
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.2
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.05
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	2
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.272

Equation S18

$$C_w = DF * GW_{obj} = 50$$
Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
DF	Default Value of 20 or Equation S22	unitless	20
GW_{obj}	TACO Appendix B Table E or Equation S23	mg/L	2.5

Equation S19

$$K_d = K_{oc} * f_{oc} = 6.916$$
Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
K_{oc}	Chemical Specific TACO Appendix C Table E	cm^3/g	182
f_{oc} (Organic Carbon Content)	Field measurement or TACO Appendix C Table B	g/g	0.038

The calculated Remediation Objective must now be compared to the C_{sat} value, the most restrict value will be the Tier 2 screening level.

Equation S29

$$C_{sat} = \frac{S}{\rho_b} * \left[(K_d * \rho_b) + \theta_w + (H' * \theta_a) \right]$$

= 3694.0   (Calculated Value)

650   (TACO Value)

Where

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
S	Chemical Specific TACO Appendix C Table E	mg/L	526
K_d	See equation S19 above	L/kg	6.916
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.2
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.05
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	2
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.272

Results:

Chemical Name	Remediation Objective	C_{sat}	Tier 2 Screening Level
Toluene	351.140	650.0	351.140

TACO SSL Model: Subsurface Soil Cleanup Objectives for Contaminants Based Upon the Migration to Groundwater Exposure Route

Compound/Analyte: Toluene

Equation S17

$$\text{Re}\,mediation\,Objective = C_w * \left[K_d + \frac{\theta_w + \theta_a * H'}{\rho_b} \right]$$ = 58.910

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
C_w	See equation S18 below	mg/L	50
K_d	See equation S19 below	L/kg	1.0374
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.16
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.24
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.6
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.272

Equation S18

$$C_w = DF * GW_{obj}$$ = 50

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
DF	Default Value of 20 or Equation S22	unitless	20
GW_{obj}	TACO Appendix B Table E or Equation S23	mg/L	2.5

Equation S19

$$K_d = K_{oc} * f_{oc}$$ = 1.0374

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
K_{oc}	Chemical Specific TACO Appendix C Table E	cm^3/g	182
f_{oc} (Organic Carbon Content)	Field measurement or TACO Appendix C Table B	g/g	0.0057

The calculated Remediation Objective must now be compared to the C_{sat} value, the most restrict value will be the Tier 2 screening level.

Equation S29

$$C_{sat} = \frac{S}{\rho_b} * [(K_d * \rho_b) + \theta_w + (H' * \theta_a)]$$

= 619.7	(Calculated Value)
650	(TACO Value)

Where

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
S	Chemical Specific TACO Appendix C Table E	mg/L	526
K_d	See equation S19 above	L/kg	1.0374
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.16
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.24
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.6
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.272

Results:

Chemical Name	Remediation Objective	C_{sat}	Tier 2 Screening Level
Toluene	58.910	619.7	58.910

TACO SSL Model: Subsurface Soil Cleanup Objectives for Contaminants Based Upon the Migration to Groundwater Exposure Route

Compound/Analyte: Toluene

Equation S17

$$\text{Re}\,mediation\,Objective = C_w * \left[K_d + \frac{\theta_w + \theta_a * H^{'}}{\rho_b} \right]$$

= 58.390

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
C_w	See equation S18 below	mg/L	50
K_d	See equation S19 below	L/kg	1.0374
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.17
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.19
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.7
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.272

Equation S18

$$C_w = DF * GW_{obj}$$ = 50

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
DF	Default Value of 20 or Equation S22	unitless	20
GW_{obj}	TACO Appendix B Table E or Equation S23	mg/L	2.5

Equation S19

$$K_d = K_{oc} * f_{oc}$$ = 1.0374

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
K_{oc}	Chemical Specific TACO Appendix C Table E	cm^3/g	182
f_{oc} (Organic Carbon Content)	Field measurement or TACO Appendix C Table B	g/g	0.0057

The calculated Remediation Objective must now be compared to the C_{sat} value, the most restrict value will be the Tier 2 screening level.

Equation S29

$$C_{sat} = \frac{S}{\rho_b} * [(K_d * \rho_b) + \theta_w + (H' * \theta_a)]$$

= 614.3   (Calculated Value)
650   (TACO Value)

Where

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
S	Chemical Specific TACO Appendix C Table E	mg/L	526
K_d	See equation S19 above	L/kg	1.0374
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.17
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.19
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.7
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.272

Results:

Chemical Name	Remediation Objective	C_{sat}	Tier 2 Screening Level
Toluene	58.390	614.3	58.390

TACO SSL Model: Surface Soil Cleanup Objectives for Contaminants Based Upon the Migration to Groundwater Exposure Route

Compound/Analyte: Xylenes

Equation S17

$$Re\,mediationObjective = C_w * \left[K_d + \frac{\theta_w + \theta_a * H'}{\rho_b} \right] \quad = 2005.333$$

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
C_w	See equation S18 below	mg/L	200
K_d	See equation S19 below	L/kg	9.88
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.15
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.28
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.5
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.25

Equation S18

$$C_w = DF * GW_{obj} \quad = 200$$
Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
DF	Default Value of 20 or Equation S22	unitless	20
GW_{obj}	TACO Appendix B Table E or Equation S23	mg/L	10

Equation S19

$$K_d = K_{oc} * f_{oc} \quad = 9.88$$
Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
K_{oc}	Chemical Specific TACO Appendix C Table E	cm^3/g	260
f_{oc} (Organic Carbon Content)	Field measurement or TACO Appendix C Table B	g/g	0.038

The calculated Remediation Objective must now be compared to the C_{sat} value, the most restrict value will be the Tier 2 screening level.

Equation S29

$$C_{sat} = \frac{S}{\rho_b} * \left[\left(K_d * \rho_b \right) + \theta_w + \left(H' * \theta_a \right) \right]$$

= 1865.0   (Calculated Value)
320   (TACO Value)

Where

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
S	Chemical Specific TACO Appendix C Table E	mg/L	186
K_d	See equation S19 above	L/kg	9.88
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.15
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.28
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.5
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.25

Results:

Chemical Name	Remediation Objective	C_{sat}	Tier 2 Screening Level
Xylenes	2005.3	320.0	320.00

TACO SSL Model: Surface Soil Cleanup Objectives for Contaminants Based Upon the Migration to Groundwater Exposure Route

Compound/Analyte: Xylenes

Equation S17

$$Re\, mediationObjective = C_w * \left[K_d + \frac{\theta_w + \theta_a * H'}{\rho_b} \right] = 1997.250$$

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
C_w	See equation S18 below	mg/L	200
K_d	See equation S19 below	L/kg	9.88
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.2
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.05
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	2
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.25

Equation S18

$$C_w = DF * GW_{obj} = 200$$

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
DF	Default Value of 20 or Equation S22	unitless	20
GW_{obj}	TACO Appendix B Table E or Equation S23	mg/L	10

Equation S19

$$K_d = K_{oc} * f_{oc} = 9.88$$

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
K_{oc}	Chemical Specific TACO Appendix C Table E	cm^3/g	260
f_{oc} (Organic Carbon Content)	Field measurement or TACO Appendix C Table B	g/g	0.038

The calculated Remediation Objective must now be compared to the C_{sat} value, the most restrict value will be the Tier 2 screening level.

Equation S29

$$C_{sat} = \frac{S}{\rho_b} * [(K_d * \rho_b) + \theta_w + (H' * \theta_a)]$$

= 1857.4   (Calculated Value)

320   (TACO Value)

Where

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
S	Chemical Specific TACO Appendix C Table E	mg/L	186
K_d	See equation S19 above	L/kg	9.88
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.2
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.05
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	2
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.25

Results:

Chemical Name	Remediation Objective	C_{sat}	Tier 2 Screening Level
Xylenes	1997.3	320.0	320

TACO SSL Model: Subsurface Soil Cleanup Objectives for Contaminants Based Upon the Migration to Groundwater Exposure Route

Compound/Analyte: Xylenes

Equation S17

$$\mathrm{Re}\,mediationObjective = C_w * \left[K_d + \frac{\theta_w + \theta_a * H^{'}}{\rho_b} \right] = 323.9$$

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
C_w	See equation S18 below	mg/L	200
K_d	See equation S19 below	L/kg	1.482
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.16
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.24
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.6
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.25

Equation S18

$$C_w = DF * GW_{obj} = 200$$

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
DF	Default Value of 20 or Equation S22	unitless	20
GW_{obj}	TACO Appendix B Table E or Equation S23	mg/L	10

Equation S19

$$K_d = K_{oc} * f_{oc} = 1.482$$

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
K_{oc}	Chemical Specific TACO Appendix C Table E	cm^3/g	260
f_{oc} (Organic Carbon Content)	Field measurement or TACO Appendix C Table B	g/g	0.0057

The calculated Remediation Objective must now be compared to the C_{sat} value, the most restrict value will be the Tier 2 screening level.

Equation S29

$$C_{sat} = \frac{S}{\rho_b} * \left[(K_d * \rho_b) + \theta_w + (H' * \theta_a) \right]$$

= 301.2   (Calculated Value)
320   (TACO Value)

Where

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
S	Chemical Specific TACO Appendix C Table E	mg/L	186
K_d	See equation S19 above	L/kg	1.482
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.16
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.24
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.6
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.25

Results:

Chemical Name	Remediation Objective	C_{sat}	Tier 2 Screening Level
Xylenes	323.9	301.2	301.20

TACO SSL Model: Subsurface Soil Cleanup Objectives for Contaminants Based Upon the Migration to Groundwater Exposure Route

Compound/Analyte: Xylenes

Equation S17

$$\text{Re}\,mediation\,Objective = C_w * \left[K_d + \frac{\theta_w + \theta_a * H'}{\rho_b} \right] = 322.0$$

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
C_w	See equation S18 below	mg/L	200
K_d	See equation S19 below	L/kg	1.482
q_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.17
q_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.19
r_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.7
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.25

Equation S18

$$C_w = DF * GW_{obj} = 200$$

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
DF	Default Value of 20 or Equation S22	unitless	20
GW_{obj}	TACO Appendix B Table E or Equation S23	mg/L	10

Equation S19

$$K_d = K_{oc} * f_{oc} = 1.482$$

Where:

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
K_{oc}	Chemical Specific TACO Appendix C Table E	cm^3/g	260
f_{oc} (Organic Carbon Content)	Field measurement or TACO Appendix C Table B	g/g	0.0057

The calculated Remediation Objective must now be compared to the C_{sat} value, the most restrict value will be the Tier 2 screening level.

Equation S29

$$C_{sat} = \frac{S}{\rho_b} * \left[(K_d * \rho_b) + \theta_w + (H' * \theta_a) \right]$$

= 299.4   (Calculated Value)

320   (TACO Value)

Where

Parameter	Tier 2 Input Value	Units	Value Used for Calculation
S	Chemical Specific TACO Appendix C Table E	mg/L	186
K_d	See equation S19 above	L/kg	1.482
θ_w (water filled porosity)	Equation S20 or default values in TACO Appendix C Table B	L_{water}/L_{soil}	0.17
θ_a (air filled porosity)	Equation S21 or default values in TACO Appendix C Table B	L_{air}/L_{soil}	0.19
ρ_b (soil bulk density)	Field Measurement or TACO Appendix C Table B	kg/L	1.7
H' (Henry's Law Constant)	Chemical Specific TACO Appendix C Table E	unitless	0.25

Results:

Chemical Name	Remediation Objective	C_{sat}	Tier 2 Screening Level
Xylenes	322.0	299.4	299.4

Datasheet B: Physical Soil Parameters for the RBCA Equations

Area(s)/Location(s) at the site, if applicable:

Predominant Soil Type (e.g., clay, sand, silty clay, etc.):

Surface (top 1 meter) or Subsurface (below 1 meter):

Site-specifc values [i.e., field measurements (F=) or calculated values using the SSL equation (Sxx=)] are to be reported if they are used in developing the Tier 2 cleanup objectives. Acceptable procedures for obtaining these values are identified in Appendix C, Table F of TACO.

Parameter	Soil Type	Default Value	Units	Field Measurement or Calculated	Value
ρb (Soil Bulk Density)	Surface and/or Subsurface soils	1.5	g/cm³	F =	
	Gravel	2.0			
	Sand	1.8		Surface	1.50
	Silt	1.6		Subsurface	1.70
	Clay	1.7			
w (Moisture Content)	Surface and/or Subsurface Soils	0.1	gwater/gsoil (unitless)		
	Surface Soils	0.1			
	Subsurface Soils	0.2			
foc (Organic Carbon Content)	Surface Soils	0.006	g/g	Surface	0.006
	Subsurface Soils	0.002	(unitless)	Subsurface	0.006
θ_T (Total Soil Porosity)	Surface and/or Subsurface Soils	0.43	cm³/cm³ (unitless)		
	Gravel	0.25			
	Sand	0.32		Surface	0.43
	Silt	0.40		Subsurface	0.36
	Clay	0.36			
θ_{as} (Air-filled Soil Porosity)	Surface Soils	0.28	cm³/cm³ (unitless)		
	Subsurface Soils	0.13			
	Gravel	0.05			
	Sand	0.14		Surface	0.28
	Silt	0.24		Subsurface	0.19
	Clay	0.19			
θ_{ws} (Water-filled Soil Porosity)	Surface	0.15	cm³/cm³ (unitless)		
	Subsurface Soils	0.30			
	Gravel	0.20		Surface	0.15

Datasheet B: Physical Soil Parameters for the RBCA Equations

Sand	0.18	Subsurface	0.17
Silt	0.16		
Clay	0.17		

Datasheet C: Chemical Properties

Chemical	Solubility in Water (S) (mg/L)	Diffusivity in Air (Di) (cm²/s)	Diffusivity in Water (Dw) (cm²/s)	Henry's Law Constant (H' @ 25°C)	Organic Carbon Partition Coefficient (Koc - L/kg)	First Order Decay Constant (λ - 1/day)
Benzene	1.75E+003	8.80E-002	9.80E-006	2.28E-001	5.89E+001	0.000900

Datasheet RBCA-V.   Migration to Ground Water - Class 2

Datasheet RBCA-V is to be used to propose soil cleanup objectives for the migration to ground water exposure route calculated by the equation in Appendix C, Table C of TACO: Equation R12 (residential, industrial/commercial and construction worker scenarios). Equations described under RBCA-VI and RBCA-VIII as well as the equations in 35 Ill. Adm. Code 620, Subpart F may also be required to generate some of the input values for equation R12. Note; use 35 Ill. Code 620, Subpart F to calculate cleanup objectives for noncarcinogens. Since values listed in RBCA-XIII are used in this evaluation, this dataheet must be submitted. In cases where the target cancer risk (TR) exceeds 1 in 1,000,000, Datasheet -VI must also be submitted.

Land Use Scenario: **ALL**

Institutional Control   YES   NO

Engineered Barrier   YES   NO

GW_{source} (mg/L)	See below	X (cm)	518.00
LF_{sw} [(mg/L)/(mg/kg)]*	See below	α_x (cm)	52
GW_{comp} (mg/L)**	See below	α_y (cm)	17
$C(x)/C_{source}$ (unitless)***	See below	α_z (cm)	3
U (cm/d)	0.0479	S_w (cm)	100
K (cm/d)	0.863	λ (1/d)****	See below
i (cm/cm)	0.0200	S_d (cm)	200
θ_T (cm³/cm³-soil)*****	0.36		

* LFsw reported on Datasheet RBCA-XIII   ** GWcomp reported on Datasheet RBCA-VI

*** C(x)/Csource reported on Datsheet RBCA-VI   **** Chemical Parameters (see Datasheet C)

***** Physical Soil Parameters (see Datasheet B)

Chemical Name	GW_{source} (mg/L)	LF_{sw} (mg/L)/(mg/kg)	GW_{comp} (mg/L)	$C(x)/C_{source}$ (unitless)	λ (1/day)	Soil Cleanup Objective (mg/kg)
Benzene			0.025	6.80E-04	0.000900	

Datasheet RBCA-XIII. LFsw

Datasheet RBCA-XIII is to be used to propose the leaching factor calculated by the equation in Appendix C, Table C of TACO: Equation R14 (residential, industrial/commercial and constructin worker scenarios). The use of Equations R20 and R24 in TACO are necessary to generate some of the input values for Equation R14. Since the values in Datasheet RBCA-XI are used in this evaluation, this Datasheet must also be submitted.

k_s (g_water/g_soil)*	See below	ρ_s (g/cm³)**	1.70
H' (unitless)***	See below	θ_{ws} (unitless)**	0.17
U_{gw} (cm/yr)****	6.30	θ_{as} (unitless)**	0.19
K (cm/yr)	315.00		
i (unitless)	0.020		
δ_{gw} (cm)	200		
I (cm/yr)	30		
W (cm)	100		

* k_s value reported on Datasheet RBCA-XI   ** Physical Soil Properties (see Datasheet B)
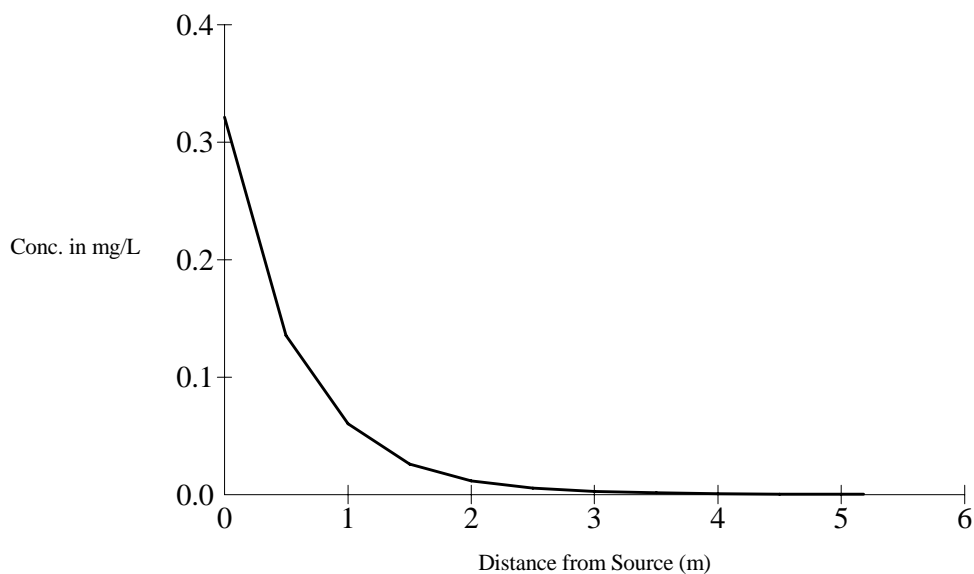***Chemical Properties (see Datasheet C)   **** U_{gw} value as calculated using Equation R24

Chemical Name	k_s (g_water/g_soil)	H' (unitless)	LFsw (mg/L_water)/(mg/kg_soil)
Benzene	0.3357	2.28E-001	

Pitney Court

Calculated Ground Water Information

Benzene

Conc. in mg/L — Distance from Source (m)

Distance to Meet Ground Water Objectives

Class I	Class II
2.57 m.	1.53 m.

Calculated Ground Water Concentrations

Distance from Source (m)	Calculated Concentration (mg/L)
0	3.21E-01
0.5	1.35E-01
1	6.04E-02
1.5	2.61E-02
2	1.17E-02
2.5	5.54E-03
3	2.78E-03
3.5	1.46E-03
4	7.98E-04
4.5	4.52E-04
5	2.64E-04
5.18	2.19E-04

Datasheet B: Physical Soil Parameters for the RBCA Equations

Area(s)/Location(s) at the site, if applicable:

Predominant Soil Type (e.g., clay, sand, silty clay, etc.):

Surface (top 1 meter) or Subsurface (below 1 meter):

Site-specifc values [i.e., field measurements (F=) or calculated values using the SSL equation (Sxx=)] are to be reported if they are used in developing the Tier 2 cleanup objectives. Acceptable procedures for obtaining these values are identified in Appendix C, Table F of TACO.

Parameter	Soil Type	Default Value	Units	Field Measurement or Calculated	Value
ρb (Soil Bulk Density)	Surface and/or Subsurface soils	1.5	g/cm³	F =	
	Gravel	2.0			
	Sand	1.8		Surface	1.50
	Silt	1.6		Subsurface	1.70
	Clay	1.7			
w (Moisture Content)	Surface and/or Subsurface Soils	0.1	gwater/gsoil (unitless)		
	Surface Soils	0.1			
	Subsurface Soils	0.2			
foc (Organic Carbon Content)	Surface Soils	0.006	g/g	Surface	0.006
	Subsurface Soils	0.002	(unitless)	Subsurface	0.006
θ_T (Total Soil Porosity)	Surface and/or Subsurface Soils	0.43	cm³/cm³ (unitless)		
	Gravel	0.25			
	Sand	0.32		Surface	0.43
	Silt	0.40		Subsurface	0.36
	Clay	0.36			
θ_{as} (Air-filled Soil Porosity)	Surface Soils	0.28	cm³/cm³ (unitless)		
	Subsurface Soils	0.13			
	Gravel	0.05			
	Sand	0.14		Surface	0.28
	Silt	0.24		Subsurface	0.19
	Clay	0.19			
θ_{ws} (Water-filled Soil Porosity)	Surface	0.15	cm³/cm³ (unitless)		
	Subsurface Soils	0.30			
	Gravel	0.20		Surface	0.15

Datasheet B: Physical Soil Parameters for the RBCA Equations

Sand	0.18	Subsurface	0.17
Silt	0.16		
Clay	0.17		

Datasheet C: Chemical Properties

Chemical	Solubility in Water (S) (mg/L)	Diffusivity in Air (Di) (cm²/s)	Diffusivity in Water (Dw) (cm²/s)	Henry's Law Constant (H' @ 25°C)	Organic Carbon Partition Coefficient (Koc - L/kg)	First Order Decay Constant (λ - 1/day)
Benzene	1.75E+003	8.80E-002	9.80E-006	2.28E-001	5.89E+001	0.000900

Datasheet RBCA-V.   Migration to Ground Water - Class 2

Datasheet RBCA-V is to be used to propose soil cleanup objectives for the migration to ground water exposure route calculated by the equation in Appendix C, Table C of TACO: Equation R12 (residential, industrial/commercial and construction worker scenarios). Equations described under RBCA-VI and RBCA-VIII as well as the equations in 35 Ill. Adm. Code 620, Subpart F may also be required to generate some of the input values for equation R12. Note; use 35 Ill. Code 620, Subpart F to calculate cleanup objectives for noncarcinogens. Since values listed in RBCA-XIII are used in this evaluation, this datasheet must be submitted. In cases where the target cancer risk (TR) exceeds 1 in 1,000,000, Datasheet -VI must also be submitted.

Land Use Scenario: **ALL**

Institutional Control   YES   NO

Engineered Barrier   YES   NO

GW_{source} (mg/L)	See below	X (cm)	1,981.00
LF_{sw} [(mg/L)/(mg/kg)]*	See below	α_x (cm)	198
GW_{comp} (mg/L)**	See below	α_y (cm)	66
$C(x)/C_{source}$ (unitless)***	See below	α_z (cm)	10
U (cm/d)	0.0479	S_w (cm)	100
K (cm/d)	0.863	λ (1/d)****	See below
i (cm/cm)	0.0200	S_d (cm)	200
θ_T (cm³/cm³-soil)*****	0.36		

* LF_{sw} reported on Datasheet RBCA-XIII   ** GW_{comp} reported on Datasheet RBCA-VI

*** $C(x)/C_{source}$ reported on Datsheet RBCA-VI   **** Chemical Parameters (see Datasheet C)

***** Physical Soil Parameters (see Datasheet B)

Chemical Name	GW_{source} (mg/L)	LF_{sw} (mg/L)/(mg/kg)	GW_{comp} (mg/L)	$C(x)/C_{source}$ (unitless)	λ (1/day)	Soil Cleanup Objective (mg/kg)
Benzene			0.025	2.54E-08	0.000900	

Datasheet RBCA-XIII. LFsw

Datasheet RBCA-XIII is to be used to propose the leaching factor calculated by the equation in Appendix C, Table C of TACO: Equation R14 (residential, industrial/commercial and constructin worker scenarios). The use of Equations R20 and R24 in TACO are necessary to generate some of the input values for Equation R14. Since the values in Datasheet RBCA-XI are used in this evaluation, this Datasheet must also be submitted.

k_s (gwater/gsoil)*	See below	ρ_s (g/cm³)**	1.70
H' (unitless)***	See below	θ_{ws} (unitless)**	0.17
U_{gw} (cm/yr)****	6.30	θ_{as} (unitless)**	0.19
K (cm/yr)	315.00		
i (unitless)	0.020		
δ_{gw} (cm)	200		
I (cm/yr)	30		
W (cm)	100		

* k_s value reported on Datasheet RBCA-XI   ** Physical Soil Properties (see Datasheet B)
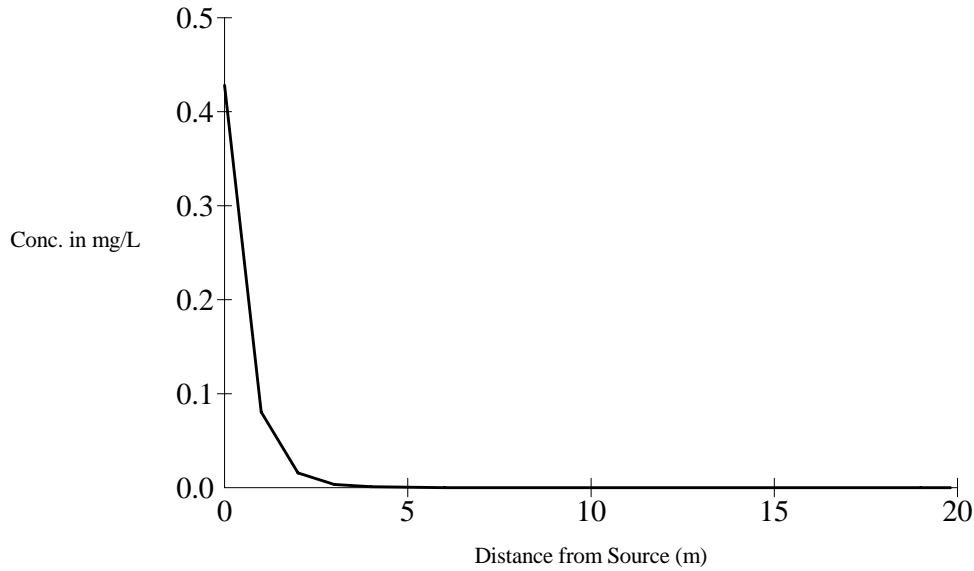***Chemical Properties (see Datasheet C)   **** U_{gw} value as calculated using Equation R24

Chemical Name	k_s (gwater/gsoil)	H' (unitless)	LFsw (mg/Lwater)/(mg/kgsoil)
Benzene	0.3357	2.28E-001	

Pitney Court

Calculated Ground Water Information

Benzene

Conc. in mg/L — Distance from Source (m)

Distance to Meet Ground Water Objectives

Class I	Class II
2.78 m.	1.70 m.

Calculated Ground Water Concentrations

Distance from Source (m)	Calculated Concentration (mg/L)
0	4.28E-01
1	8.05E-02
2	1.56E-02
3	3.70E-03
4	1.06E-03
5	3.52E-04
6	1.29E-04
7	5.09E-05
8	2.15E-05
9	9.59E-06
10	4.48E-06
11	2.17E-06
12	1.09E-06
13	5.60E-07
14	2.96E-07
15	1.61E-07
16	8.87E-08

Calculated Ground Water Concentrations

Distance from Source (m)	Calculated Concentration (mg/L)
17	5.00E-08
18	2.87E-08
19	1.67E-08
19.81	1.09E-08

Table E1 - Groundwater to Surface Water Interface Calculation Summary
Soil Component of the Groundwater Pathway to the Site Boundary
Former Pitney Court Station

Sample Location/ Constituent	Distance to the Site Boundary*	Source Concentration in Soil	Leaching Factor	Source Concentration in Groundwater	Predicted Conc. @ the Property Line	Class II Criteria	Meets Class II Criteria
	(m)	(mg/kg)	(mg/L)/(mg/kg)	(mg/L)	(mg/L)	(mg/L)	
CF082-002							
Benzene	5.18	0.21	1.53	0.32	2.19E-04	0.025	Yes
CF125-002							
Benzene	19.81	0.28	1.53	0.43	1.09E-08	0.025	Yes

Note:
* - The distance used is the shortest distance to the Site boundary from a cell sample location based upon the direction of groundwater flow.

Table E1 - Groundwater to Surface Water Interface Calculation Summary							
Soil Component of the Groundwater Pathway to the Site Boundary							
Former Pitney Court Station							
Sample Location/ Constituent	Distance to the Site Boundary*	Source Concentration in Soil	Leaching Factor	Source Concentration in Groundwater	Predicted Conc. @ the Property Line	Class II Criteria	Meets Class II Criteria
	(m)	(mg/kg)	(mg/L)/(mg/kg)	(mg/L)	(mg/L)	(mg/L)	
CF082-002							
Benzene	5.18	0.21	1.53	0.32	2.19E-04	0.025	Yes
CF125-002							
Benzene	19.81	0.28	1.53	0.43	1.09E-08	0.025	Yes

Note:
* - The distance used is the shortest distance to the Site boundary from a cell sample location based upon the direction of groundwater flow.

Datasheet B: Physical Soil Parameters for the RBCA Equations

Area(s)/Location(s) at the site, if applicable:

Predominant Soil Type (e.g., clay, sand, silty clay, etc.):

Surface (top 1 meter) or Subsurface (below 1 meter):

Site-specifc values [i.e., field measurements (F=) or calculated values using the SSL equation (Sxx=)] are to be reported if they are used in developing the Tier 2 cleanup objectives. Acceptable procedures for obtaining these values are identified in Appendix C, Table F of TACO.

Parameter	Soil Type	Default Value	Units	Field Measurement or Calculated	Value
ρb (Soil Bulk Density)	Surface and/or Subsurface soils	1.5	g/cm³	F =	
	Gravel	2.0			
	Sand	1.8		Surface	1.50
	Silt	1.6		Subsurface	1.70
	Clay	1.7			
w (Moisture Content)	Surface and/or Subsurface Soils	0.1	gwater/gsoil (unitless)		
	Surface Soils	0.1			
	Subsurface Soils	0.2			
foc (Organic Carbon Content)	Surface Soils	0.006	g/g	Surface	0.006
	Subsurface Soils	0.002	(unitless)	Subsurface	0.006
θ_T (Total Soil Porosity)	Surface and/or Subsurface Soils	0.43	cm³/cm³ (unitless)		
	Gravel	0.25			
	Sand	0.32		Surface	0.43
	Silt	0.40		Subsurface	0.36
	Clay	0.36			
θ_{as} (Air-filled Soil Porosity)	Surface Soils	0.28	cm³/cm³ (unitless)		
	Subsurface Soils	0.13			
	Gravel	0.05			
	Sand	0.14		Surface	0.28
	Silt	0.24		Subsurface	0.19
	Clay	0.19			
θ_{ws} (Water-filled Soil Porosity)	Surface	0.15	cm³/cm³ (unitless)		
	Subsurface Soils	0.30			
	Gravel	0.20		Surface	0.15

Datasheet B: Physical Soil Parameters for the RBCA Equations

Sand	0.18	Subsurface	0.17
Silt	0.16		
Clay	0.17		

Datasheet C: Chemical Properties

Chemical	Solubility in Water (S) (mg/L)	Diffusivity in Air (Di) (cm²/s)	Diffusivity in Water (Dw) (cm²/s)	Henry's Law Constant (H' @ 25°C)	Organic Carbon Partition Coefficient (Koc - L/kg)	First Order Decay Constant (λ - 1/day)
Benzene	1.75E+003	8.80E-002	9.80E-006	2.28E-001	5.89E+001	0.000900

Datasheet RBCA-V.   Migration to Ground Water - Class 2

Datasheet RBCA-V is to be used to propose soil cleanup objectives for the migration to ground water exposure route calculated by the equation in Appendix C, Table C of TACO: Equation R12 (residential, industrial/commercial and construction worker scenarios). Equations described under RBCA-VI and RBCA-VIII as well as the equations in 35 Ill. Adm. Code 620, Subpart F may also be required to generate some of the input values for equation R12. Note; use 35 Ill. Code 620, Subpart F to calculate cleanup objectives for noncarcinogens. Since values listed in RBCA-XIII are used in this evaluation, this datasheet must be submitted. In cases where the target cancer risk (TR) exceeds 1 in 1,000,000, Datasheet -VI must also be submitted.

Land Use Scenario: **ALL**

Institutional Control   YES   NO

Engineered Barrier   YES   NO

GW_{source} (mg/L)	See below	X (cm)	518.00
LF_{sw} [(mg/L)/(mg/kg)]*	See below	α_x (cm)	52
GW_{comp} (mg/L)**	See below	α_y (cm)	17
$C(x)/C_{source}$ (unitless)***	See below	α_z (cm)	3
U (cm/d)	0.0479	S_w (cm)	100
K (cm/d)	0.863	λ (1/d)****	See below
i (cm/cm)	0.0200	S_d (cm)	200
θ_T (cm³/cm³-soil)*****	0.36		

* LF$_{sw}$ reported on Datasheet RBCA-XIII   ** GW$_{comp}$ reported on Datasheet RBCA-VI

*** C(x)/C$_{source}$ reported on Datsheet RBCA-VI   **** Chemical Parameters (see Datasheet C)

***** Physical Soil Parameters (see Datasheet B)

Chemical Name	GW_{source} (mg/L)	LF_{sw} (mg/L)/(mg/kg)	GW_{comp} (mg/L)	$C(x)/C_{source}$ (unitless)	λ (1/day)	Soil Cleanup Objective (mg/kg)
Benzene			0.025	6.80E-04	0.000900	

Datasheet RBCA-XIII. LFsw

Datasheet RBCA-XIII is to be used to propose the leaching factor calculated by the equation in Appendix C, Table C of TACO: Equation R14 (residential, industrial/commercial and constructin worker scenarios). The use of Equations R20 and R24 in TACO are necessary to generate some of the input values for Equation R14. Since the values in Datasheet RBCA-XI are used in this evaluation, this Datasheet must also be submitted.

k_s (gwater/gsoil)*	See below	ρ_s (g/cm³)**	1.70
H' (unitless)***	See below	θ_{ws} (unitless)**	0.17
Ugw (cm/yr)****	6.30	θ_{as} (unitless)**	0.19
K (cm/yr)	315.00		
i (unitless)	0.020		
δ_{gw} (cm)	200		
I (cm/yr)	30		
W (cm)	100		

* k_s value reported on Datasheet RBCA-XI   ** Physical Soil Properties (see Datasheet B)
Chemical Properties (see Datasheet C)   * Ugw value as calculated using Equation R24

Chemical Name	k_s (gwater/gsoil)	H' (unitless)	LFsw (mg/Lwater)/(mg/kgsoil)
Benzene	0.3357	2.28E-001	

Pitney Court

Calculated Ground Water Information

Benzene

Conc. in mg/L (y-axis) vs Distance from Source (m) (x-axis)

Distance to Meet Ground Water Objectives

Class I	Class II
2.57 m.	1.53 m.

Calculated Ground Water Concentrations

Distance from Source (m)	Calculated Concentration (mg/L)
0	3.21E-01
0.5	1.35E-01
1	6.04E-02
1.5	2.61E-02
2	1.17E-02
2.5	5.54E-03
3	2.78E-03
3.5	1.46E-03
4	7.98E-04
4.5	4.52E-04
5	2.64E-04
5.18	2.19E-04

Datasheet B: Physical Soil Parameters for the RBCA Equations

Area(s)/Location(s) at the site, if applicable:

Predominant Soil Type (e.g., clay, sand, silty clay, etc.):

Surface (top 1 meter) or Subsurface (below 1 meter):

Site-specifc values [i.e., field measurements (F=) or calculated values using the SSL equation (Sxx=)] are to be reported if they are used in developing the Tier 2 cleanup objectives. Acceptable procedures for obtaining these values are identified in Appendix C, Table F of TACO.

Parameter	Soil Type	Default Value	Units	Field Measurement or Calculated	Value
ρb (Soil Bulk Density)	Surface and/or Subsurface soils	1.5	g/cm³	F =	
	Gravel	2.0			
	Sand	1.8		Surface	1.50
	Silt	1.6		Subsurface	1.70
	Clay	1.7			
w (Moisture Content)	Surface and/or Subsurface Soils	0.1	gwater/gsoil (unitless)		
	Surface Soils	0.1			
	Subsurface Soils	0.2			
foc (Organic Carbon Content)	Surface Soils	0.006	g/g	Surface	0.006
	Subsurface Soils	0.002	(unitless)	Subsurface	0.006
θ_T (Total Soil Porosity)	Surface and/or Subsurface Soils	0.43	cm³/cm³ (unitless)		
	Gravel	0.25			
	Sand	0.32		Surface	0.43
	Silt	0.40		Subsurface	0.36
	Clay	0.36			
θ_{as} (Air-filled Soil Porosity)	Surface Soils	0.28	cm³/cm³ (unitless)		
	Subsurface Soils	0.13			
	Gravel	0.05			
	Sand	0.14		Surface	0.28
	Silt	0.24		Subsurface	0.19
	Clay	0.19			
θ_{ws} (Water-filled Soil Porosity)	Surface	0.15	cm³/cm³ (unitless)		
	Subsurface Soils	0.30			
	Gravel	0.20		Surface	0.15

Datasheet B: Physical Soil Parameters for the RBCA Equations

Sand	0.18	Subsurface	0.17
Silt	0.16		
Clay	0.17		

Datasheet C: Chemical Properties

Chemical	Solubility in Water (S) (mg/L)	Diffusivity in Air (Di) (cm²/s)	Diffusivity in Water (Dw) (cm²/s)	Henry's Law Constant (H' @ 25°C)	Organic Carbon Partition Coefficient (Koc - L/kg)	First Order Decay Constant (λ - 1/day)
Benzene	1.75E+003	8.80E-002	9.80E-006	2.28E-001	5.89E+001	0.000900

Datasheet RBCA-V.   Migration to Ground Water - Class 2

Datasheet RBCA-V is to be used to propose soil cleanup objectives for the migration to ground water exposure route calculated by the equation in Appendix C, Table C of TACO: Equation R12 (residential, industrial/commercial and construction worker scenarios). Equations described under RBCA-VI and RBCA-VIII as well as the equations in 35 Ill. Adm. Code 620, Subpart F may also be required to generate some of the input values for equation R12. Note; use 35 Ill. Code 620, Subpart F to calculate cleanup objectives for noncarcinogens. Since values listed in RBCA-XIII are used in this evaluation, this datasheet must be submitted. In cases where the target cancer risk (TR) exceeds 1 in 1,000,000, Datasheet -VI must also be submitted.

Land Use Scenario: **ALL**   Institutional Control   YES   NO

Engineered Barrier   YES   NO

GW$_{source}$ (mg/L)	See below	X (cm)	1,981.00
LF$_{sw}$ [(mg/L)/(mg/kg)]*	See below	α$_x$ (cm)	198
GW$_{comp}$ (mg/L)**	See below	α$_y$ (cm)	66
C(x)/C$_{source}$ (unitless)***	See below	α$_z$ (cm)	10
U (cm/d)	0.0479	S$_w$ (cm)	100
K (cm/d)	0.863	λ (1/d)****	See below
i (cm/cm)	0.0200	S$_d$ (cm)	200
θ$_T$ (cm³/cm³-soil)*****	0.36		

* LF$_{sw}$ reported on Datasheet RBCA-XIII   ** GW$_{comp}$ reported on Datasheet RBCA-VI

*** C(x)/C$_{source}$ reported on Datsheet RBCA-VI   **** Chemical Parameters (see Datasheet C)

***** Physical Soil Parameters (see Datasheet B)

Chemical Name	GW$_{source}$ (mg/L)	LF$_{sw}$ (mg/L)/(mg/kg)	GW$_{comp}$ (mg/L)	C(x)/C$_{source}$ (unitless)	λ (1/day)	Soil Cleanup Objective (mg/kg)
Benzene			0.025	2.54E-08	0.000900	

Datasheet RBCA-XIII. LFsw

Datasheet RBCA-XIII is to be used to propose the leaching factor calculated by the equation in Appendix C, Table C of TACO: Equation R14 (residential, industrial/commercial and constructin worker scenarios). The use of Equations R20 and R24 in TACO are necessary to generate some of the input values for Equation R14. Since the values in Datasheet RBCA-XI are used in this evaluation, this Datasheet must also be submitted.

k_s (gwater/gsoil)*	See below	ρ_s (g/cm³)**	1.70
H' (unitless)***	See below	θ_{ws} (unitless)**	0.17
U_{gw} (cm/yr)****	6.30	θ_{as} (unitless)**	0.19
K (cm/yr)	315.00		
i (unitless)	0.020		
δ_{gw} (cm)	200		
I (cm/yr)	30		
W (cm)	100		

* k_s value reported on Datasheet RBCA-XI   ** Physical Soil Properties (see Datasheet B)
Chemical Properties (see Datasheet C)   * U_{gw} value as calculated using Equation R24

Chemical Name	k_s (gwater/gsoil)	H' (unitless)	LFsw (mg/Lwater)/(mg/kgsoil)
Benzene	0.3357	2.28E-001	

Pitney Court

Calculated Ground Water Information

Benzene

Conc. in mg/L

Distance from Source (m)

Distance to Meet Ground Water Objectives

Class I	Class II
2.78 m.	1.70 m.

Calculated Ground Water Concentrations

Distance from Source (m)	Calculated Concentration (mg/L)
0	4.28E-01
1	8.05E-02
2	1.56E-02
3	3.70E-03
4	1.06E-03
5	3.52E-04
6	1.29E-04
7	5.09E-05
8	2.15E-05
9	9.59E-06
10	4.48E-06
11	2.17E-06
12	1.09E-06
13	5.60E-07
14	2.96E-07
15	1.61E-07
16	8.87E-08

Calculated Ground Water Concentrations

Distance from Source (m)	Calculated Concentration (mg/L)
17	5.00E-08
18	2.87E-08
19	1.67E-08
19.81	1.09E-08

Date: August 4, 2005

View facing east showing former vacant warehouse building along 31st Street.

Date: August 8, 2005

View facing south showing building demolition.

Date: August 9, 2005

View facing east showing building demolition.

Date: September 7, 2005

View facing north showing concrete block wall along northern site boundary.

Date: September 16, 2005

View facing southwest showing clearing and grubbing.

Date: September 23, 2005

View facing northwest showing berm installation along the River.

Date: September 27, 2005

View facing north showing concrete slab breaking along north side of Site.

Date: October 18, 2005

View facing east showing the ground surface after removal of the concrete slab under the former building.

Date: October 26, 2005

View facing east showing surface material excavation from areas CF002 and CF003.

Date: October 31, 2005

View facing north showing excavated areas CF004, CF005, CF010 and CF011.

Date: November 11, 2005

View facing west showing surface soil removal over tie-rods along River in areas CF012 and CF018.

Date: November 11, 2005

View facing north showing area CF016A excavation and backfill progress in areas CF004, CF005, CF010 and CF011.

Date: November 18, 2005

View facing north showing excavation progress in area CF017, adjacent to area CF018 and the tie-back system for the river wall.

Date: November 18, 2005

View facing northeast showing sheet pile installation along Pitney Court.

Date: November 23, 2005

View facing northwest showing excavation in areas CF015, CF016B and CF022.

Date: November 29, 2005

View facing northeast showing backfilling activities in areas CF005, CF006, CF011, CF012, CF017 and CF018.

Date: November 29, 2005

View facing east showing former 32-inch MGP process pipe west of former relief gas holder in areas CF027 and CF028.

Date: December 2, 2005

View facing northeast showing anchor wall sheeting installation 50-feet west of Pitney Court.

Date: December 8, 2005

View facing north showing backfill progress in areas CF015 and CF016B, and adjacent areas backfilled with CA-1.

Date: December 14, 2005

View facing northeast showing backfilling in areas CF008 and CF015 using FA-5 (screenings).

Date: December 22, 2005

View facing northwest showing areas CF004, CF005, CF006, CF010, CF011, CF012, CF016 and CF017 backfilled to grade.

12/22/2005

Date: September 15, 2006

View facing north showing removal of CA-6 backfill over and CA-1 in area CF005.

Date: September 25, 2006

View facing north showing excavation activities in areas CF012 and CF018.

Date: September 27, 2006

View facing north showing buried concrete structure and impacted materials near the southern portion of CF018.

Date: October 3, 2006

View facing north showing excavation limits of areas CF023 and CF029 at approximately 12-feet bgs.

Date: October 9, 2006

View of 12-foot deep unimpacted excavation floor with deeper test pits in areas CF023, CF029 and CF035.

Date: October 12, 2006

View facing east showing excavation progress at area CF034 with exposed process piping in east wall.

Date: October 18, 2006

View facing north showing excavation progress in areas CF040, CF041 and CF042.

Date: October 18, 2006

View facing southeast showing impacted material and process piping in southern wall of areas CF046 and CF047.

Date:

View facing south showing excavation progress in areas CF046 and CF047 revealing a red brick structure in southern wall of excavation.

Date: November 10, 2006

View facing east showing excavation activities in areas CF053 and CF054.

Date: November 27, 2006

View facing northeast showing old brick sewer pipe near central portion of Site areas CF074 and CF075.

Date: November 27, 2006

View facing northeast showing surface removed in areas CF050, CF061 and CF067 to facilitate strut installation for sheeting along Pitney Court.

Date: November 27, 2006

View facing north showing new struts and anchor wall in areas CF044, CF060 and CF066 north of MWRD outfall structure.

Date: November 29, 2006

View facing west showing excavation progress along the exposed brick sewer.

Date: December 4, 2006

View facing north showing excavation progress north of brick sewer (areas CF074 and CF075) where temporary bypass sewer will be installed.

Date: December 7, 2006

View facing southeast showing excavation exposing former tar well in area CF070.

Date: December 7, 2006

View facing east showing excavation exposing tar well in area CF070.

Date: December 13, 2006

View facing east showing base of excavation to 20-feet deep north of brick sewer line in areas CF074, CF075 and CF077.

Date: December 14, 2006

View facing north showing backfill activities in areas CF074, CF075 and CF077 in preparation for temporary bypass sewer construction.

Date: December 15, 2006

View facing east showing backfill progress in areas CF074, CF075 and CF077 in preparation for temporary bypass sewer installation.

Date: December 20, 2006

View facing northwest showing temporary bypass sewer system tied into former brick sewer.

Date: December 29, 2006

View facing east showing the removal of brick sewer pipe in areas CF079 and CF080.

Date: January 8, 2007

View facing north showing east end of temporary sewer bypass tied into existing sewer and excavation in area south of sewer line.

Date: January 9, 2007

View facing west showing excavation under and south of former brick sewer near area CF078 and into areas CF084, CF085, CF086, CF087 and CF088.

Date: January 12, 2007

View facing north showing native gray clay excavation bottom at 25 to 28-feet bgs in areas CF079, CF080 and CF080B.

Date: January 15, 2007

View facing west showing excavation in areas CF084, CF085, CF086, CF087 and CF088.

Date: January 19, 2007

View facing east showing backfill progress in areas CF078, CF079, CF080 and CF081.

Date: January 24, 2007

Excavation in area CF020 where a brick valve vault and piping were encountered and removed.

Date: January 31, 2007

View facing east showing installation of the replacement concrete RCP sewer bisecting Site.

Date: January 31, 2007

View facing east showing excavation progress in areas CF019, CF020, CF025 and CF026.

Date: January 31, 2007

View facing southwest showing new RCP sewer connection to existing MWRD structure.

Date: February 2, 2007

View facing north showing excavation in areas CF037, CF038 and CF039.

Date: February 21, 2007

View facing east showing excavation in areas CF051, CF062 and CF063, along backside of Pitney Court sheeting anchor wall.

Date: February 21, 2007

View facing southeast showing former MGP process components removed from area CF062.

Date: March 2, 2007

View facing south showing excavation progress in areas CF038, CF049, CF051 and CF056 up to 20-feet bgs.

Date: March 2, 2007

View facing northeast showing excavation in areas CF049, CF051 and CF052 up to 20-feet bgs.

Date: March 5, 2007

View facing east showing excavation areas CF049, CF051, CF056 and CF062 up to 20-feet bgs.

Date: March 9, 2007

View facing northeast showing excavation in areas CF065, CF069 and CF071.

Date: March 22, 2007

View facing west showing PVC barrier placement along the north face of the MWRD structure.

Date: March 23, 2007

View facing southeast showing backfill in areas CF059 and CF065, and PVC barrier along north face of MWRD structure.

Date: March 29, 2007

View facing east showing native clay bottom in excavation area CF050 along river wall.

Date: April 4, 2007

View facing south showing excavation inside earth retention system in areas CF050, CF061 and CF067 along Pitney Court.

Date: April 10, 2007

View facing north showing backfill and compaction within earth retention system in areas CF050, CF061 and CF067.

Date: April 17, 2007

View facing south showing continuation of backfilling in areas CF050, CF061 and CF067.

Date: April 24, 2007

View facing south showing excavation in areas CF093, CF107, 108, 122, 123, 136, 137 and CF151.

Date: May 24, 2007

View facing southeast showing excavation in areas CF090, CF105 and CF120, and backfilling in areas CF106 and CF121.

Date: June 13, 2007

View facing south showing excavation in areas CF133 and CF147, along the southern Site boundary.

Date: June 27, 2007

View facing north showing sidewall of area CF131 revealing remnant of a thin concrete base for the former 3 million ft^3 gas holder.

Date: July 5, 2007

View facing northeast showing excavation in areas CF103 and CF117.

Date: July 20, 2007

View facing north showing excavation in areas CF115 and CF129.

Date: August 9, 2007

View facing west showing excavation in northern portion of area CF141 where the former 185,000 gallon oil tank was encountered.

Date: August 9, 2007

View facing west showing excavation in areas CF141, CF142 and CF128.

Date: September 5, 2007

View facing west showing residual liquids from former MGP process pipe encountered in area CF111 being evacuated.

Date: September 27, 2007

View facing south
showing excavation
around existing RCP
sewer and MWRD
structure in area CF083.

Date: October 17, 2007

View facing south
showing excavation along
southern Site boundary in
area CF139.

Date: October 22, 2007

View facing south showing perimeter excavation along southern Site boundary in area CF142.

Date: December 04, 2007

View facing south showing perimeter excavation along southern Site boundary in area CF148 near building on adjacent property.

Date: January 17, 2008

View facing north showing installation of pipe struts, tie-rods, and anchor wall along the river north of MWRD outfall.

Date: February 21, 2008

View facing south showing installation of anchor wall along river south of MWRD outfall.

Date: March 6, 2008

View facing southwest showing excavation and exposing large linear concrete structure along river north of MWRD outfall.

Date: March 18, 2008

View facing west showing excavation in areas CF110 and CF124 south of MWRD outfall.

Date: March 19, 2008

View facing southwest showing expandable grout holes drillers prior to concrete cracking and demolition.

Date: March 19, 2008

View facing west showing excavation in areas CF110 and CF124 where piping associated with former tar tank was removed.

Date: March 26, 2008

View facing west showing expandable grout demolition progress by cracking the concrete.

Date: April 4, 2008

View facing west showing a tar seep encountered in area CF060 that was subsequently remediated.

Date: April 17, 2008

View facing west showing 18-foot deep excavation below former concrete structure in area CF036.

Date: April 23, 2008

View facing northwest showing backfilling along river wall north of MWRD outfall in areas CF030 and CF036 with CA-1.

Date: April 23, 2008

View facing west showing lean mix concrete slurry placed at the inside toe of the sheeting to seal potential gaps below the river mud line.

Date: April 30, 2008

View facing west showing excavation limit along south wall of area CF066 where the MWRD structure begins.

Date: May 1, 2008

View facing west showing lean mix concrete slurry placed around the concrete structure left in place within MWRD outfall and PVC barrier placed over north face of outfall area.

Date: May 6, 2008

View facing north showing excavation south of MWRD outfall in areas CF082B, CF096B, CF110B, CF124B and CF138B adjacent to the river sheeting wall.

Date: May 8, 2008

View facing southwest showing excavation adjacent to river wall south of MWRD outfall in areas CF124 and CF138.

Date: May 13, 2008

View facing north showing power pole held during excavation in area CF001.

Date: May 15, 2008

View facing south of backfill south of MWRD outfall in areas CF082, CF096, CF110, CF124 and CF138 prior to temporary strut removal.

Date: May 22, 2008

View facing east showing backfilling around power pole in northeast corner of CF001.

Date: July 2, 2008

View facing south showing Site surface after final grading.

Date: July 2, 2008

View facing south showing Site surface after final grading.